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1. CONTENTS

Aerodrome Information Leaflets (ADIL) are issued by the QCAA for purposes of promulgating supplementary guidance materials to requirements of the Qatar Civil Aviation Regulations – Aerodromes (QCAR-ADR). They are not in themselves law but may amplify a provision of the Regulations. They are intended to provide practical guidance to illustrate acceptable means, but not necessarily the only means, of complying with a requirement contained in the QCAR-ADR. Aerodrome Information Leaflets may explain certain regulatory requirements by providing interpretive and explanatory

2. Introduction

General

2.1 ***An aeronautical study***. A study of an aeronautical problem to identify possible solutions and select a solution that is acceptable without degrading safety

2.2 ***Safety assessment***. 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 when any other safety concerns arise.

Note. — Changes on an aerodrome can include changes to procedures, equipment, infrastructures, safety works, special operations, regulations, organization, etc.

2.3 A comprehensive aeronautical study allows the aerodrome operator/applicant and the QCAA to be convinced that safety and regularity of operations of aircraft is not compromised in any way. 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/applicant applies for an exemption, as a result of development or a change in the aerodrome operational conditions from a specific provision of the QCAR-ADR

2.4 Aerodrome operators/applicants shall consult their stakeholders, senior management and affected divisions/departments in their organisations as part of an aeronautical study. These consultations 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 must be approved by the senior management of the organisation before it is submitted to the QCAA for consideration of acceptance.

2.5 Aerodrome operators/applicants should note that QCAA may choose to participate in the conduct of an aeronautical study as an observer where appropriate.

3. Purpose

3.1 The purpose of this leaflet is to provide information and guidance to aerodrome operators and applicants applying for an aerodrome license on the conduct of an Aeronautical Study acceptable to QCAA to demonstrate equivalent level of safety where an aerodrome is unable to meet a requirement of the QCAR-ADR and need to identify alternative means to achieve an equivalent level of safety.

3.2 The leaflet also provides information and guidance to aerodrome operators and aerodrome license holders on the conduct of an Aeronautical Study in accordance with QCAR-ADR where an aerodrome is unable to meet a requirement of the QCAR-ADR and need to identify alternative means to achieve an equivalent level of safety.

3.3 Paragraph 5 of this leaflet recommends and explains parts of a typical aeronautical study. By comprehensively addressing all the suggested parts, the aerodrome operator should be able to complete an aeronautical study to assess the viability of solutions to an aeronautical problem. An aeronautical problem may refer to an issue related to:

a) operational regulations such as lack of procedures, insufficient maintenance programs and competency issue; or

b) design regulations such as terrain of object penetrating the Obstacle Limitation Surfaces (OLS), insufficient strip and Runway End Safety Area (RESA) (dimensions and/or quality), insufficient runway/taxiway separation and lack of or wrongly designed visual aids.

3.4 Appendix 1 to this ADIL contains a suggested checklist with the requirements to be included in an aeronautical study. The checklist can be used by the aerodrome operator as a guide to ascertain that all of the requirements have been taken into consideration and documented in the aeronautical study. However, not all the requirements found in the Appendix 1 will be applicable to every aeronautical study conducted. The aerodrome operator should therefore examine each requirement carefully to determine what is applicable.

4. References

- QCAR-ADR
- Doc 9981
- Doc 9774, 3.E & 3C.3.2

5. Applicability

5.1 This ADIL applies to all aerodrome operators licensed aerodromes and applicants applying for an aerodrome licence.

5.2 An aeronautical study may be carried out where aerodrome standards cannot be met as a result of development. Such a study is most frequently undertaken during the planning of a new airport or during licensing of an existing airport.

6. Objectives

6.1 An aeronautical study is conducted to:

a) assess the impact of deviations from aerodrome standards and regulations, or proposed changes;
b) present alternative solutions to ensure the level of safety of aircraft operations remains acceptable;
c) estimate the effectiveness of each alternative; and
d) recommend mitigating measures or operating procedures/restrictions or to compensate for any safety risks that have been identified due to the deviation.

7. A Typical Aeronautical Study Objectives

7.1 **Parts of an Aeronautical Study**

7.1.1 An aeronautical study submitted to the QCAA for determination of acceptability should comprise the following parts:

a) Aim of the Study;
b) Background;
c) Safety Assessment;
d) Recommendations;
e) Conclusion;
f) Monitoring of the deviation; and review of the study

7.2 **Aim of the Study**

7.2.1 The aim of the study should be explicitly stated. It should:

a) Address the safety concerns;
b) Identify safety measures to be put in place to ensure safe aircraft operations in an aerodrome; and
c) Make reference to the specific regulatory requirement which the study is meant to address.

7.2.2 An example to illustrate this would be as follow:

"The aim of this aeronautical study is to address the operation of Code F aircraft in a Code 4E airport, <name of airport> and to put in place <list of safety measures> necessary to ensure safe operation of Code F aircraft in <name of airport> with reference made to <reference to QCAR-ADR regulations>…"

7.3 **Background**

7.3.1 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:

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

7.3.2 An example to illustrate this would be as follows:

"Currently, <name of airport> is Code 4E airport with some Code 4F capabilities. These Code 4F capabilities includes <list of the Code 4F capabilities>... <Name of airport> is required to handle Code F 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 4F airport.

Upgrading <name of airport> from Code 4E to Code 4F 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…"

7.4 **Safety Assessment**

7.4.1 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 aerodrome operator/ applicant – a key aerodrome certification requirement. A safety assessment usually consists of the following:

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

7.4.2 There is no standard methodology to conduct a safety assessment and it is up to the aerodrome 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.

Identification of hazards and consequences

7.4.3 Hazards and its consequences should be identified and recorded in a hazard log. Aerodrome operators/applicants 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.

7.4.4 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.

7.4.5 Appendix 2 of this ADIL contains a sample hazard log. The aerodrome operator/applicant may use this to formulate its own hazard log to suit the aeronautical study.

Risk management

7.4.6 Risk is the assessment, expressed in terms of predicted probability and severity, of the consequence(s) of a hazard taking as reference the worst foreseeable situation. Risk management is the identification, analysis and elimination, and/or mitigation of such risk identified to an acceptable level.

7.4.7 The probability and severity of the consequence identified can be qualitative or quantitative. The aerodrome operator/applicant is free to use any method appropriate to the aeronautical study, but in accordance with the risk management methodology established in the aerodrome operator's/applicant's SMS. Some examples to assess the probability and severity of a consequence occurring are provided in the Appendix 3 of this ADIL.

7.4.8 A risk assessment matrix should be developed. This matrix provides a relationship between the probability and severity of a consequence of a hazard occurring. The risk indexes (combinations of the risk probability values and the risk severity values) should be placed in a risk tolerable table. Appendix 3 also gives an example of risk assessment matrix and risk tolerability.

a) Intolerable – Unacceptable under the existing circumstances.
b) Tolerable – Acceptable based on risk mitigation. It may require management decision.
c) Acceptable – Acceptable as is. No risk mitigation required.

When a safety risk assessment is due to the introduction of new aeroplane type/model to the aerodrome, a compatibility study is conducted, as specified in QCAR-ADR 1.7 should be conducted. Following items (this list is not exhaustive) therefore shall be considered within the procedures:

a) Aircraft classification number
b) Taxiway width and taxiway curves
c) Electrical interferences with navigation aids
d) Location and height of mandatory and information signs
e) Taxiway and taxilane separation distance
f) Size of apron stands
g) Push-back procedures
h) Blast areas
i) Markings
j) Ground handling procedures
k) Procedures for RFF services

Within these procedures, responsibilities shall be clearly defined, that aircraft operating or planning to operate on the aerodrome are checked with the QCAR-ADR.

7.4.9 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; and

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."

7.5 **Recommendations**

7.5.1 To allow the aerodrome operator/applicant and QCAA to be convinced and assured that the proposed deviation will not pose a drop in the level of safety, the aerodrome operator/applicant should recommend operating procedures/restrictions or other measures that will address any safety concerns. In addition, the aerodrome operator/applicant 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.

7.5.2 The recommendation 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.

7.5.3 The aerodrome 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) and Notice to Airmen (NOTAM) should be included in the study.

7.5.4 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>

7.5.5 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:

7.6 **Conclusion**

7.6.1 The aerodrome 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 aerodrome 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.

7.6.2 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>..."

7.7 **Monitoring of the Deviation and review of the study**

7.7.1 After the completion of the aeronautical study, the aerodrome 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.

7.7.2 The safety assessment should be reviewed periodically to identify any changes in the safety risks, their acceptability, and the validity of the mitigation measures. This review should also be used to determine the validity of the aeronautical study to justify the deviation as well as its continuing need.

7.7.3 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, <fixed period of time> to determine the validity of the study to justify the deviation as well as its continuing need …"

7.7.4 For temporary deviations, the aerodrome operator/applicant should also notify QCAA after the deviation has been corrected.

7.8 **Submission of Aeronautical Study to QCAA**

7.8.1 The aerodrome operator/applicant should note the guidance provided in this ADIL and use the suggested checklist provided in Appendix 1 to ensure that any aeronautical study submitted to QCAA for consideration of acceptance is thoroughly conducted and documented.

7.9 **Supporting Evidence**

7.9.1 Aeronautical Study should include all details, data and records which are considered to be related to the assessment process and study.

7.9.2 As a minimum, the Aeronautical Study should include supporting evidence, safety assessments, actions, exercises to demonstrate compliance, compliance statements, inspections, tests, results from the risk management process (hazard identification, and risk assessment and mitigation processes) and aerodrome management accountability.

7.9.3 An Aeronautical Study will only be approved (where applicable) on the basis of a robust rationale. Therefore, aeronautical study techniques should be developed, as part of a Safety Management System (SMS), at the appropriate level.

7.9.4 The responsibility for justifying, either qualitatively or quantitatively, an alternative means of compliance lies with the Aerodrome Operator. It is in the operators interest to ensure that complete and valid arguments, evidence and safety criteria are established and documented

7.10 **Checklists**

7.10.1 A suggested checklist for the reviewing of an Aeronautical Study is as shown below. Aerodrome Operators may use this checklist as a guide for developing an Aeronautical Study tailored to their individual situation.

7.11 **Record Keeping – Document Control**

7.11.1 The Aeronautical Study shall be retained for the lifetime of the system, the procedure or the activity.

Appendix 1 – Checklist for Aeronautical Study

Note: Appendix 1 provides aerodrome operators with a suggested checklist for reviewing of an aeronautical study. An aerodrome operator may use this checklist as a guide for developing an aeronautical study tailored to its individual situation. The suggested checklist for reviewing of an aeronautical study is as shown below:

	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 requirement in QCAR-ADR		
2	Consultation with stakeholders, senior management team and divisions/departments affected;		
3	The study is approved by a senior executive of the organisation		
4	Background information on the current situation;		
5	Proposed date for complying with the QCAR-ADR 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 log, risk probability and severity, risk assessment matrix, risk tolerability and risk control/mitigation);		
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;		
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	Arrangements for periodical review		
14	Notification to QCAA once the temporary deviation has been corrected.		

Appendix 2 – Hazard Log

Note: Appendix 2 provides 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:

S/N	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(s) and the resulting risk index and the residual risk tolerability
1	Aircraft operation	Operation of Code 4F aircraft in <name of airport>. Code F aircraft using runway for landing and take-off…	Wing tip collision at <parking bay numbers>. • Loss of control of aircraft during pushback / towing operations	3C	Tolerable	Use of wingwalkers. • Aircraft to taxi at <speed value>. • Training of staff for pushback / towing operations. • Restrictions on other aircraft movements within <parking bay number>.	2C	Tolerable	▪ Conduct trials to study the effectiveness of the implementation. ▪ Resulting risk index : 1C ▪ Residual risk tolerability: Acceptable

Appendix 3 – Risk Probability & Severity, Risk Assessment Matrix and Risk Tolerability

Note: Appendix C provides aerodrome operators with a suggested risk probability & severity and risk assessment matrix to be included in an aeronautical study. Aerodrome operators may use this as a guide for developing their own risk probability & severity and risk assessment matrix tailored to his individual situation.

Risk Probability

Probability of occurrence		
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

Risk Severity

Severity of occurrence		
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

Risk Assessment Matrix

Risk probability	Risk severity				
	Catastrophic A	**Hazardous B**	**Major C**	**Minor D**	**Negligible E**
Frequent 5	5A	5B	5C	5D	5E
Occasional4	4A	4B	**4C**	4D	4E
Remote 3	3A	3B	3C	3D	3E
Improbable2	2A	2B	2C	2D	2E
Extremely improbable1	1A	1B	1C	1D	1E

Risk Tolerability

Risk Index	Tolerability	Suggested Criteria
3A, 4A, 4B, 5A, 5B, 5C	**intolerable**	Unacceptable under the existing circumstances.
1A, 2A, 2B, 2C, 3B, 3C, 3D, 4C, 4D, 4E, 5D, 5E	**Tolerable**	Acceptable based on risk mitigation. It may require management decision.
1B, 1C, 1D, 1E, 2D, 2E, 3E	**Acceptable**	Acceptable as is. No risk mitigation required.