AERODROME SAFETY PUBLICATION

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Contents

1. Purpose 3
2. Applicability 3
3. Cancellation 3
4. Abbreviations and Definitions 3
5. Introduction 4
6. Legal Authority and Responsibilities 4
7. Obstacle Control 4
8. Methods of Obstacle Control 5
9. Personnel Competency And Training 5
10. Establishment of Obstacle Limitation Surfaces 6
11. Height zoning 6
12. Purchase of Easement or Property Rights 7
13. Notification of Proposed Constructions 7
14. Obstacle surveys 7
17. Marking and lighting of obstacles other than natural growths 12
18. Documentation and follow-ups 12
19. Promulgation of information on obstacles 13
20. Obstacle Data Analysis and Continuous Improvement 13
21. Queries 13
Appendix 1 Functions of the Obstacle Limitation Surfaces 14

Note – Aerodrome Safety Publications are published by the SCAA for purposes of promulgating supplementary guidance materials to the Standards and Recommended Practices (SARPs) in the Manual of Aerodrome Standards. The publications are intended to provide recommendations and guidance to illustrate a means, but not necessarily the only means, of complying with SARPs. Aerodrome Safety Publications may explain certain regulatory requirements by providing interpretive and explanatory materials.

While they often provide recommendations, in accordance with STS-ADR, Chapter 2, Subpart A, Provision 2.2.2, any provision within these publications that uses the terms "shall" or "must" is considered mandatory and enforceable. Such provisions along with any figures, appendices and tables associated with it carry the same weight as the primary text of the STS and must be complied with at all times.

1. Purpose

1.1 The purpose of this Aerodrome Safety Publication (ASP) is to provide guidance to demonstrate compliance with, and information related to the handling of obstructions such as the limitation, control of obstacles, and making arrangements for the removal or lowering of obstacles to ensure the safe operation of aircraft at the aerodrome.

2. Applicability

2.1. This ASP applies to all aerodrome operators subjected to Regulation 61 of the Civil Aviation (Safety) Regulations, 2017 and the Seychelles Technical Standards - Aerodromes.

2.2. This ASP is applicable to an aerodrome operator who intends to or holds an aerodrome certificate.

3. Cancellation

3.1. The issue 2 supersedes the Issue 1 of ASP 08.

4. Abbreviations and Definitions

4.1 Abbreviations

AIS	Aeronautical Information Services
ANSI	Air Navigation Services Inspectorate
ASP	Aerodrome Safety Publication
ATC	Air Traffic Control
ICAO	International Civil Aviation Organization
OLS	Obstacles Limitation Surfaces
SCAA	Seychelles Civil Aviation Authority
STS-ADR	Seychelles Technical Standards - Aerodromes

4.2 **Definitions**

Aerodrome operator
Any person or legal entity authorized by the Authority to manage and operate an aerodrome by means of issuance of an aerodrome certificate.

Obstacle
Any fixed (whether temporary or permanent) or mobile object or part thereof, which is located in an area intended for the surface movement of aircraft, or which extends above a defined surface intended to protect aircraft in flight, or stand outside those defined surfaces and that have been assessed as being a hazard to air navigation.

Obstacle limitation surfaces
Means a series of surfaces that define the volume of airspace at and around an aerodrome to be kept free of obstacles in order to permit the intended aircraft operations to be conducted safely and to prevent the aerodrome from becoming unusable by the growth of obstacles around the aerodrome.

Aerial activities

Are specialised aircraft operations conducted for tasks such as surveying, photography, agricultural spraying, search and rescue, patrol, and aerial advertisement, which do not primarily involve transporting passengers or cargo.

5. Introduction

5.1. The effective utilization of an aerodrome may be considerably influenced by man-made activities and natural features/growths (e.g. trees) within the aerodrome and its vicinity. These may result in:

a) limitations on the distances available for take-off and landing;

b) limitations on the range of meteorological conditions in which take-off and landing operations can be undertaken;

c) a reduction in the payload of some aircraft types;

d) restrictions on operations of certain aircraft types;

e) any of the combinations above; or

f) closure the aerodromes.

5.2 To ensure safe and efficient aircraft operations, certain parts of the local airspace must be treated as integral to the aerodrome environment. Freedom from obstacles in these areas is as critical as the physical condition of runways and strips, since both natural growth and man-made structures can pose hazards to aircraft.

6. Legal Authority and Responsibilities

6.1. SCAA as the authority has primary responsibility to establish criteria for the limitation of obstacles, review obstacle assessments and/or aeronautical studies, approval of obstacles and provide guidance/assistance to those directly concerned with control of obstacles.

6.2. The aerodrome operators have the ultimate responsibility for limitation and control of obstacles. This includes the responsibility for controlling obstacles on aerodrome's property and for arranging the removal or lowering of existing obstacles outside the aerodrome's boundaries. Where necessary, the obligation can be met by negotiations leading to purchase or condemnation (where authorized) of air easements or title to the properly.

7. Obstacle Control

7.1 The aerodrome operator should formalize an arrangement with the SCAA and relevant authorities to deal with the timely removal or lowering of obstacles.

7.2 Procedures and arrangements to remove or lower such obstacles should be developed in consultation with relevant stakeholder, may be captured in the aerodrome manual as standard operating procedures or as separate documents, which should be updated as and when there are changes.

7.3 For those obstacles that could not be removed or lowered, and if deemed that these obstacles would need to be marked and lit, the aerodrome operator should also formalise an arrangement with relevant authorities for the monitoring of these visual aids.

7.4 Effective obstacle control processes require the collective efforts of various parties including the operator, relevant authorities, property / construction site owners and

the general public. These efforts would provide a safe environment for efficient and safe operation of aircraft at and near the aerodrome. In this regard, the operator should regularly engage the relevant parties to ensure that the established processes are robust and effective.

7.5 The aerodrome operator should take necessary corrective actions to address any penetrations, non-compliances and / or aerial activities.

7.6 The aerodrome operator should minimally consider the following elements for its obstacle control process:

a) frequency and timing of obstacle surveys;
b) marking and lighting of obstacles other than natural growths;
c) personnel competency and training;
d) calibration of equipment required for obstacle surveys;
e) conduct of day obstacle surveys;
f) conduct of night obstacle surveys;
g) documentation and follow-ups;
h) promulgation of information on obstacles; and
i) obstacle data analysis and continuous improvement.
j) Engagement with relevant authorities and stakeholder in removal of obstacles.

8. Methods of Obstacle Control

8.1. The viability and safety of aerodrome use by aircraft operators can be assured by establishing effective obstacle control to maintain the obstacle limitation surfaces. Control can be achieved, in a number of ways, including:

a) enactment of height zoning protection by the local authority;
b) purchasing of easement or property rights;
c) notification of proposed construction;
d) establishment and implementation of an effective obstacle monitoring and removal programme; or
e) a combination of all the above.

9. Personnel Competency And Training

9.1 The operator shall ensure that the personnel (e.g. aerodrome personnel or contractor) conducting the obstacle surveys are properly trained and are able to perform the obstacle surveys.

9.2 The operator shall put in place a formal and structured training programme for the personnel. The training programme should include recurrent training so as to maintain the proficiency of personnel and keep them updated on new developments and technology which may enhance their work.

9.3 The relevant aerodrome personnel or contractor shall also be conversant with the following:

a) correct use of equipment as required for the obstacle surveys;
b) familiar with the aerodrome layout and its surroundings;
c) identify different types of tall construction equipment used at sites;

d) identify different species of trees and their characteristics found within the aerodrome and its vicinity;
e) read obstacle charts and be able to accurately relate obstacles in the chart to their actual ground locations;
f) calculate and measure the range and bearing of an obstacle from the aerodrome reference point; and
g) promulgate a Notice to Airmen (NOTAM) to inform air traffic service and pilots of an obstacle and its location.

10. Establishment of Obstacle Limitation Surfaces

10.1. Aerodrome operators shall establish the obstacle limitation surfaces and provide to the SCAA, and other agencies and local planning bodies (for use in developing height zoning limits) with pertinent information about each aerodrome, including:

a) location, orientation, length and elevation of all runways;

b) locations and elevations of all reference points used in establishing obstacle limitation surfaces;

c) proposed categories of runway use - non-instrument, non-precision approach or precision approach (category I, II or III);

d) plans for future runway extension or change in category

11. Height zoning

11.1. The objective of height zoning is to protect the aerodrome obstacle limitation surfaces from intrusion by man-made objects and natural growth such as trees. Height zoning may provide for a minimum allowable height for land use in the vicinity of the aerodrome. Land use zoning is also a means of preventing erection of new obstacles.

11.2. This is done by the enactment of ordinances identifying height limits underneath the aerodrome obstacle limitation surfaces. The responsibility for the enactment of such an ordinance is a matter between the SCAA, aerodrome operator and the local authority.

11.3. To give effect to height-zoning a zoning map should be prepared for the guidance of the responsible local authority. The map is a composite, relating all zoning criteria to the ground level around the aerodrome. It should cover the aerodrome design obstacle limitation surfaces and, where applicable, the take-off flight paths for the aerodrome obstacle chart Type “A”.

11.4. Typical zoning ordinances include a statement of the purpose of, or necessity for, the action. They include a description of the obstacle limitation surfaces which should conform to the aerodrome design surfaces and, if applicable, the aerodrome obstacle chart Type “A”. They also contain a statement of allowable heights which should conform to the specifications for these surfaces. Provisions are made, in the ordinances, for a maximum allowable height, for existing non-conforming uses, for marking and lighting of obstacles and for appeals from the provision of the ordinance. The matter of bird control could also be addressed at the same time by defining areas which the sitting of gravel pits, refuse dumps, sewage outfalls and other features, which attract birds, may be subjected to restriction in the interests of aviation safety.

12. Purchase of Easement or Property Rights

12.1. In those areas where zoning is inadequate the aerodrome operator may take steps to protect the obstacle limitation surfaces by other means.

12.2. The aerodrome operator could achieve these objectives either by purchase of easements or property rights. Of these two alternatives, the purchase of easements would often prove to be simpler and more economical. In this case, the aerodrome operator secures the consent of the owner (after paying suitable compensation) to lower the height of the obstacle in question. Where agreement can be reached for the reduction in height of an obstacle, the agreement should include a written aviation easement limiting heights over the property to specific levels unless effective height zoning has been established.

12.3. Where negotiations to obtain easements are not successful, then the airport operator should give consideration to the second alternative, i.e. purchase of the property. The aerodrome operator could resort to the acquisition of the property by condemnation if the government has authorized such action. In such cases, the airport operator must pay a reasonable compensation to the property owner, i.e. at the fair market value of the property.

13. Notification of Proposed Constructions

13.1 The aerodrome operator shall establish procedures and formal arrangements with relevant stakeholders and authorities for the timely notification of any proposed construction or development within or in the vicinity of the aerodrome that may exceed or penetrate established Obstacle Limitation Surfaces (OLS).

13.2 Prior to initiating any construction or installation within or in the vicinity of the aerodrome that may exceed the established obstacle limitation surfaces, the aerodrome operator shall consult the SCAA for guidance.

Note – Refer to ADN 10 - Procedures for the Approval of Obstacles

14. Obstacle surveys

14.1 Identification of obstacles requires a complete engineering survey of all areas under the aerodrome obstacle limitation surfaces. Such surveys may be generally conducted by governmental authorities with the co-operation of the aerodrome operator. In the absence of a governmental survey, the aerodrome operator should conduct the survey with their own personnel or with the assistance of a consultant or local operators.

14.2 The initial survey should produce a chart presenting a plan view of the entire aerodrome and its surroundings. The scope of the chart should be to the outer limit of the conical, approach and take-off climb surfaces. It will need to include profile views of all obstacle limitation surfaces. Each obstacle should be identified in both plan and profile with its description and height above the datum, which should be specified on the chart. Engineering field surveys can be supplemented by aerial photographs and photogrammetry to identify possible obstacles not readily visible from the aerodrome.

14.3 The survey specification for the aerodrome obstacle chart Type “A” is to be obtained from SCAA’s ANSI, as it is data and information that is required to be provided for

promulgation by AIS.

14.4 The aerodrome operator should conduct periodic surveys to ensure the validity of the information in the initial survey. Furthermore, the aerodrome operator should conduct:

a) frequent visual observations of surrounding areas to determine the presence of new obstacles;

b) follow-up surveys whenever significant changes occur;

c) a detailed survey of a specific area when the initial survey indicates the presence of obstacles for which a obstacle control programme is contemplated.

14.5 Following completion of an obstacle control programme, the area should be resurveyed to provide corrected data on the presence or absence of obstacles. Similarly, revision surveys should be conducted if changes are made, or planned, to the aerodrome characteristics such as runway length, elevation or orientation. No firm rule can be set down for the frequency of periodic surveys, but constant vigilance is required. Changes in obstacle data arising from surveys are to be notified to the Aeronautical Information Service (AIS) as soon as practicable for promulgation to aircraft operators.

14.6 Frequency and timing of obstacle surveys

The aerodrome operator should conduct regular day and night obstacle surveys within his aerodrome and its vicinity, and should consider, but not limited to, the following when determining the frequency and timing of such surveys:

a) locations and types of activities e.g. construction works, kite surfing, kite flying;
b) timing at which the activities are being carried out;
c) area of coverage and scope of each survey;
d) for tree surveys, the species of natural growths (e.g. species of trees); and
e) records on previous penetrations, non-compliances and / or unauthorized aerial activities

15. Conduct of Obstacle Surveys

15.1 Day obstacle surveys within the aerodrome and its vicinity are conducted to ascertain the following:

a) Obstacles are within the maximum allowable height approved by SCAA and are appropriately marked and/or lit;

b) Erected objects (e.g. construction equipment etc..) have been approved by SCAA;

c) Markings, markers, and lights on vehicles and other objects (e.g. construction equipment and buildings) are in proper working condition and properly maintained;

d) Natural growths (e.g. trees) are within its allowable height;

e) Aerial activities, if any, approved by SCAA; and

f) Follow-up actions have been taken arising from previous OLS infringements, non-compliances and / or unauthorised presence of construction equipment as well as aerial activities, if any.

15.2 The aerodrome operator should be aware of the developments within the aerodrome and its vicinity and should also be aware of the outcomes of the previous surveys conducted, i.e. any penetrations, non-compliances and / or unauthorized aerial activities noted, to effectively plan his survey route. As the route may change from time to time, the personnel should record down the changes and their reasons in the checklists used. Being the one to conduct the day obstacle survey, the aerodrome personnel should be familiar with the area to be surveyed and the locations of sites to be checked.

15.3 The aerodrome personnel should carry with the following items for the obstacles survey:

a) Up-to-date checklists for day obstacle survey (to be completed by personnel during the survey);
b) Information on construction vehicles and equipment that has obtained an approval for operations, and other requirements;
c) Information on approved aerial activities and other requirements, if any;
d) Information on outcomes of previous surveys conducted;
e) Up-to-date obstacle charts / aerodrome maps;
f) Binoculars;
g) Digital camera;
h) Calibrated GPS device;
i) Calibrated height measuring instrument
j) Documentation to facilitate his access to areas for the purposes of the survey; and
k) Torchlight (for night survey)

15.4 The aerodrome operator should make use of observation points to assist in the survey. In the event that access to certain sites are required for the survey, the operator should seek necessary permissions from the land or property owner and make arrangements for access to the site.

Survey of construction activities

15.5 The aerodrome operator, when conducting a survey on a construction site, should:

a. be in the appropriate personal protective equipment;

b. obtain documentary proof of the approval for erection of relevant objects from the person-in-charge of the construction site

c. verify that numbers, types and heights of construction equipment used at the site do not pose as unauthorised obstacles. If the height measurements of the construction equipment could not be easily taken, the heights of the surrounding structures could be referred to as reference;

d. if there are no works at night, check that all equipment are retracted/lowered and lit in accordance with the relevant requirements; and

e. inform and provide supporting documentation (e.g. photographs) to SCAA and the person-in-charge of the construction site if unauthorised obstacles have been detected.

15.6 In the event where a construction equipment has exceeded the approved height limit, the aerodrome personnel is required to advise the person-in-charge to lower the equipment to the allowable height. If the equipment could not be lowered, the aerodrome personnel should immediately report the penetration to SCAA, the air traffic service units and other appropriate authorities, and promulgate a NOTAM to notify on the detected obstacle.

The operator should also highlight the following issues, to the land or property owner, if encountered:

a. Flags should not increase the hazard presented by the object they mark. The operator could use binoculars to inspect the flags. Flags in poor conditions (e.g. faded, torn) should be replaced.

b. Markings painted on buildings and structures located within the aerodrome that are of poor conditions (e.g. faded) should be repainted.

c. When checking the obstacle lights at night, an obstacle light that is unlit or significantly dimmer than the other obstacle lights should be replaced.

15.7 The aerodrome operator should refer to the STS-Aerodromes for specifications of flags used for marking different objects and markings used for marking buildings and structures.

Survey of trees

15.8 In the case of natural growths (e.g. trees), the aerodrome the operator should make arrangements with the property owner to remove such obstacles (e.g. by trimming the trees).

15.9 The property owner can give such assurance by agreeing to trim the trees when necessary, or by permitting access to the premises to have the trimming done by the aerodrome operator's representative.

15.10 It is important to understand the species of the trees which pose a problem, assess the growth rate of these trees and trim them low enough so that the ensuing growth will be below the height limits until the next survey. In this regard, the aerodrome personnel should identify trees that are near to their height limits for closer monitoring and / or possible proactive actions (e.g. trimming) to prevent them from exceeding their height limits.

15.11 If a tree was found to have exceeded its height limit, the aerodrome personnel should immediately inform SCAA, the air traffic service units and other appropriate authorities of the penetration, and promulgate a NOTAM so that aircraft operations can be conducted safely at all times. The aerodrome personnel should arrange for the affected tree to be trimmed and after trimming the affected tree, the personnel should verify if the height of the tree is below its height limit, and cancel the existing

NOTAM issued, if required.

Survey of aerial activities

15.12 Survey of approved aerial activities cleared should be conducted by the aerodrome personnel. The personnel should ensure that the aerial activities are carried out in accordance with applicable approvals. If the personnel sighted any unauthorised aerial activities during the day survey that would pose a danger to aircraft operations, he should inform the person-in-charge to cease the activity and advise the latter to seek applicable approvals before the recommencement of the activity. The aerodrome personnel should report the unauthorised activity to accordingly.

15.13 In the event where an unauthorised aerial activity cannot be stopped, the personnel should inform the responsible post holder to ascertain if the activity has exceeded its height limit, and if yes, the personnel should immediately report the penetration to SCAA, the air traffic services units and other appropriate authorities, and promulgate a NOTAM so that aircraft operations can be conducted safely at all times. For all other cases, the personnel should immediately report the unauthorised aerial activity to the responsible post holder and SCAA.

Survey of buildings

15.14 Similar to the construction equipment mentioned in the above paragraphs, buildings located at the aerodrome and its vicinity are required to be surveyed for obstacle lights. The aerodrome personnel should conduct checks to determine the serviceability of the obstacle lights and ensure that these lights meet the STS requirements as required. Besides checking for the presence of the physical light fixture and whether it is properly lit, i.e., the particular light has similar intensity / brightness as the other lights located on the same building or nearby buildings, the personnel should also check if the specifications of the light stated in the STS-ADR and / or the approval are being complied with.

15.15 In any event where the aerodrome personnel is not able to ascertain the characteristics of the light, he may obtain documentation proof from the person-in-charge that the lights used are indeed in compliance with the requirements. If the person-in-charge is not able to show any documentary proof, the aerodrome personnel should advise him on the requirements and the replacement of the lights, if required. The personnel should report the noncompliance accordingly.

Night survey of vehicles and mobile objects within the airside

15.16 As part of the obstacle survey within the airside, the aerodrome personnel should check that the use and serviceability of lights on for follow-me vehicles and mobile objects are as specified in STS-ADR.

15.17 Besides checking for the presence of the physical light fixture and whether it is properly lit, i.e., the particular light has similar intensity / brightness as the other lights found on the same vehicle / mobile object or other similar vehicles and mobile objects located around the same area, the personnel should also check if the specifications of the light stated in the STS-ADR are being complied with.

15.18 In the event that a vehicle or mobile object is not appropriately lit, the aerodrome personnel should immediately inform the person-in-charge of the vehicle or mobile object and collect evidence and supporting documentation (e.g. photographs). Meanwhile, the vehicle or mobile object should not be used unless the lights are

replaced and have met the requirements.

16. Calibration of Equipment for Obstacle Surveys

16.1 The equipment required for obstacle surveys, such as height measuring equipment and Global Positioning System (GPS) device, should be calibrated to ensure its accuracy and integrity before using. In cases where the calibration may be done in-house i.e., by the aerodrome personnel, the personnel should be competent and is familiar with the self-calibration process. Otherwise, the calibration should be sent to the manufacturer for calibration as recommended before its due date.

16.2 The operator should ensure that the calibration records of the equipment are retained.

16.3 The operator should also ensure that there is spare equipment available to be used for obstacle surveys when the main equipment is found to be unserviceable.

17. Marking and lighting of obstacles other than natural growths

17.1 The aerodrome operator should make every effort to have the obstacles removed or reduced in height so that they no longer pose danger to aircraft operations.

17.2 Where it is impractical to remove an obstacle or to have an obstacle reduced in height, it should be appropriately marked and / or lit so as to be clearly visible to pilots in all weather and visibility conditions. STS-ADR, Chapter *10 - Visual Aids for Denoting Obstacles*, contains detailed requirements concerning marking and / or lighting of obstacles.

17.3 It should be noted that the marking and lighting of obstacles is intended to reduce hazards to aircraft by indicating their presence. It does not necessarily reduce operating limitations which may be imposed by the obstacle.

17.4 Vehicles and other mobile objects, excluding aircraft, on movement area of an aerodrome are obstacles and should be marked and if the vehicles and aerodrome are used at night or in conditions of low visibility, lighted, except that aircraft servicing equipment and vehicles used only on aprons may be exempt.

17.5 The airport operator should inspect all obstacle lights and markings within the aerodrome and its vicinity, and take necessary steps to have unserviceable lights repaired or replaced, and faded markings painted or replaced.

18. Documentation and follow-ups

18.1 The aerodrome operator should take photographs of the trees, aerial activities, buildings, vehicles and mobile objects sighted during the survey for record purposes. These photographs should be printed and filed with the completed checklists.

18.2 In all cases, it is important that the aerodrome operator records down all the survey information and outcomes in the checklists as they may be used for subsequent surveys or obstacle data analysis. For the purpose of NOTAM promulgation, geographical coordinates of the location of the penetration / unauthorized aerial activity should be determined in terms of World Geodetic System – 1984 (WGS-84) format using a calibrated GPS device. The aerodrome operator should annotate in the up-to-date aerodrome obstacle charts, locations of the on-going activities near the aerodrome as well as the penetrations, non-compliances and unauthorized aerial activities noted during the surveys. For the latter, the aerodrome operator should

conduct follow-ups including revisiting the site the next day or two to ensure proper closures of these penetrations, non-compliances and unauthorized aerial activities, and subsequently inform SCAA on the outcomes.

18.3 It is a good practice for the aerodrome personnel to share the survey conducted and its outcomes with the other personnel who may be conducting subsequent surveys. This sharing may be incorporated into the shift change / taking over sessions between personnel.

19. Promulgation of information on obstacles

19.1 The geographical coordinates, top elevation, type, marking and lighting, if any of the obstacles within the aerodrome and its vicinity should be measured and reported by the aerodrome operator to the Aeronautical Information Service (AIS).

19.2 Whenever a penetration, either temporary or permanent in nature, is identified, the aerodrome operator is required to report the penetration immediately to SCAA, the air traffic service units and other appropriate authorities. The aerodrome operator is responsible to ensure that information on obstacles is promptly transmitted to the AIS (e.g. issuance of NOTAM) The aerodrome operator has the most direct interest in seeing that information is properly disseminated, and through the periodic surveys, the aerodrome operator is most likely to be aware of the presence of new obstacles. The aerodrome operator should report all data on obstacles, including marking and lighting, if any to the AIS for promulgation. Such data should be amended at regular intervals as may be necessary to keep it up-to-date.

20. Obstacle Data Analysis and Continuous Improvement

20.1 The aerodrome operator should make use of the obstacle data collected and conduct periodic data analysis. This should allow the aerodrome operator to review the overall effectiveness of the obstacle control process. Through such analysis, the aerodrome operator should also be able to identify potential risks and hotspots and develop mitigating measures to address them.

20.2 The aerodrome operator should seek continuous improvement in the obstacle control process to ensure that safe aircraft operations can be carried out safely and efficiently at his aerodrome. The aerodrome operator should review the process and ensure that it complies with SCAA requirements at all times.

21. Queries

21.1 Any queries relating to this Aerodrome Safety Publications should be addressed to Head of Aerodromes & Ground Aids Inspectorate on seyaga@scaa.sc

Aerodrome & Ground Aids Inspectorate
Seychelles Civil Aviation Authority

Appendix 1

Functions of the Obstacle Limitation Surfaces

Outer Horizontal Surfaces

A1 Significant operational problems can arise from the erection of tall structures in the vicinity of aerodromes beyond the areas currently recognized in the Seychelles Technical Standards as areas in which restriction of new construction may be necessary. The operational implications fall broadly under the headings of safety and efficiency.

A2 It is particularly desirable to review carefully any proposal to erect high mast or other skeletal structures in areas which would otherwise be suitable for use by aircraft on wide visual circuits, on arrival routes towards the airport or circuit, or on departure or missed approach climb-paths. Avoidance by marking or lighting cannot be relied upon in view of the relatively inconspicuous character of these structures, especially in conditions of reduced visibility, and notification of their existence will similarly not always guarantee avoidance.

A3 If tall structures are erected in m near areas otherwise suitable for instrument approach procedures, increased procedure heights may need to be adopted, with consequent adverse effects on regularity and on the duration of the approach procedure, such as the denial of useful altitude allocations to aircraft in associated holding patterns. Such structures may furthermore limit desirable flexibility for radar vectored initial approaches and the facility to turn en-route during the departure climb or missed approach.

A4 In view of these potentially important operational considerations, aerodrome operators are required to adopt measures to ensure that they have advance notice of any proposals to erect tall structures. This will enable them to study the aeronautical implications and take such action as may be at their disposal to protect aviation interests.

A5 As a broad specification for the outer horizontal surface, tall structures can be considered to be of possible significance if they are both higher than 30m above local ground level, and higher than 150m above aerodrome elevation within a radius of 15000m of the centre of the aerodrome where the runway code number is 3 or 4. The area of concern may need to be extended to coincide with the obstacle-accountable areas of PANS OPS for the individual approach procedures at the aerodrome under consideration

Inner Horizontal Surface and Conical Surface

A6 The purpose of the inner horizontal surface is to protect airspace for visual circling prior to landing, possibly after descent through cloud aligned with a runway other than that in use for landing.

A7 Whilst visual circling protection for slower aircraft using shorter runways may be achieved by a single circular inner horizontal surface, with an increase in speed it becomes essential to adopt a race-track pattern (Similar to PANS-OPS) and use circular arcs centered on runway strip ends joined tangentially by straight lines. To protect two or more widely spaced runways, a more complex pattern could become necessary, involving four or more circular arcs.

A8 To satisfy the intention of the inner horizontal surface, the aerodrome operator should

select a datum elevation from which the top elevation of the surface is determined. Selection of the datum should take account of:

a) the elevations of the most frequently used altimeter setting datum points;
b) minimum circling altitudes in use or required; and
c) the nature of operations at the aerodrome.

A9 For relatively level runways the choice of datum is not critical, but when the thresholds differ by more than 6m, the datum selected should have particular regard to the factors above. For complex inner horizontal surfaces, a common elevation is not essential, but where surfaces overlap the lower surface should be regarded as dominant.

Approach and Transitional Surfaces

A10 These surfaces define the volume of airspace that should be kept free from obstacles to protect an aeroplane in the final phase of approach-to-land manoeuvre. Their slopes and dimensions will vary with the aerodrome reference code and whether the runway is used for visual, non-precision or precision approaches.

Take-off Climb Surface

A11 This surface provides protection for an aircraft on take-off by indicating which obstacles should be removed, if possible and marked or lighted if removal is impossible. The dimensions and slopes also vary with the aerodrome reference code.

Inner Approach, Inner Transitional and Balked Landing Surfaces

A12 Together, these surfaces define a volume of airspace in the immediate vicinity of a precision approach runway which is known as the obstacle-free zone (OFZ). This zone shall be kept free from fixed objects, other than lightweight frangible aids to air navigation which must be near the runway to perform their function, and from transient objects such as aircraft and vehicles when an OFZ is established for a precision approach runway category I, it shall be clear of such objects when the runway is used for category I ILS approaches.

A13 The OFZ provided on a precision approach runway where the code number is 3 or 4 is designed to protect an aeroplane with a wingspan of 60m on a precision approach below a height of 30m having been correctly aligned with the runway at that height, to climb at a gradient of 3.33% and diverge from the runway centre line at a splay no greater than 10%. The gradient of 3.33% is the lowest permitted for an all-engine-operating balked landing. A horizontal distance of 1800m from threshold to the start of the balked landing surface assumes that the latest point for a pilot to initiate a balked landing is the end of the touchdown zone marking/lighting, and that changes to aircraft configuration to achieve a positive climb gradient will normally require a further distance of 900m which is equivalent to a maximum time of about 15 seconds. A slope of 33.33% for the inner transitional surfaces results from a 3.33% climb gradient with a splay of 10%.

A14 The OFZ for a precision approach runway category I where the code number is 1 or 2 is designed to protect an aeroplane with a wing span of 30m to climb at a gradient of 4% and diverge from the runway centre line at a splay no greater than 10%. The gradient of 4% is that of the normal take-off climb surface for these

aeroplanes. When allied to a 10% splay, it results in a slope for the inner transitional surfaces of 40%. The balked landing surface originates at 60 m beyond the far end of the runway from threshold and is coincident with the take-off climb surface for the runway.

Note - For principles of shielding consult STS ADR Chapter 8, Subpart C