



AERODROME SAFETY PUBLICATION

Number: ASP 08

Issue No.: 01

Issued: 08 February 2022

Effective Date: 08 February 2022

Subject: Control of Obstacles

References: Seychelles Technical Standards – Aerodromes (STS-ADR)
ICAO Annex 14, Volume I – Aerodrome design & operations
ICAO Doc 9137 – Airport Services Manual, Part 6
ICAO Doc 9137 – Airport Services Manual, Part 8
Civil Aviation Authority of Singapore – ASP06/2017221

Contents

1. Purpose	2
2. Applicability	2
3. Cancellation	2
4. Introduction	2
5. Functions of the surfaces	3
6. Responsibilities	6
7. Establishment of obstacle limitation surfaces	6
8. Staff competency and training	7
9. Objective of obstacle control	7
10. Methods of obstacle control	8
11. Height zoning	8
12. Purchase of easement or property rights	9
13. Notification of proposed constructions	9
14. Obstacle surveys	10
15. Marking and lighting of obstacles other than natural growths	20
16. Promulgation of information on obstacles	20
17. Obstacle data analysis and continuous improvement	21
18. Conclusion	21
19. Queries	21

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.

1. Purpose

- 1.1. The purpose of this Aerodrome Safety Publication (ASP) is to provide guidance to aerodrome operators on controlling of obstacles at and in the vicinity of aerodromes. It provides guidance on what is acceptable to the Aerodromes Safety & Standards Inspectorate (ASSI) of the Seychelles Civil Aviation Authority (SCAA) to demonstrate compliance with regulatory requirements in Chapter 8 of STS-ADR.

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.

3. Cancellation

- 3.1. Nil.

4. Introduction

- 4.1. The effective utilization of an aerodrome may be considerably influenced by man-made activities¹ 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.
- 4.2. To ensure safety and efficiency of aircraft operations, certain areas of the local airspace must be regarded as integral parts of the aerodrome environment. The degree of freedom from obstacles in these areas is as important to the safe and efficient use of the aerodrome as are the more obvious physical requirements of the runways and their associated strip.
- 4.3. Obstacle limitation surfaces (OLS) are defined in STS-ADR as:
 “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.”

¹ Man-made activities include construction activities and aerial activities such as flying or operating a kite, parasail, captive balloon, model aircraft or unmanned airship.

- 4.4. The OLS are intended to be of a permanent nature. To be effective, they should be enacted in local zoning laws or as part of a national planning consultation scheme. The surfaces established should allow not only for existing operations but also for the ultimate development envisaged for each aerodrome.
- 4.5. As the holder of an aerodrome certificate, the aerodrome operator is responsible to ensure aircraft operate safely from his aerodrome. In this regard, he is responsible for the limitation and control of obstacles within his aerodrome and making arrangements for the removal or lowering of obstacles around his aerodrome. For the latter, the aerodrome operator should formalize an arrangement with relevant authorities to deal with the timely removal or lowering of obstacles. 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 formalize an arrangement with relevant authorities for the monitoring of these visual aids. Such arrangements could be captured in the aerodrome manual and/or procedures owned by the aerodrome operator, provided that relevant parties and other relevant authorities are consulted and have agreed to it. These arrangements could be reviewed and changed, at any time, by any party, if necessary. However, all affected parties will need to be consulted and agreed to the proposed changes before the changes can be effected and documented.

5. Functions of the surfaces

5.1. Outer Horizontal Surface

- a) 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.

Safety implications: 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.

Efficiency implications: 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.

- b) 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.
- c) 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

5.2. Inner Horizontal Surface and Conical Surface

- a) The purpose of the inner horizontal surface is to protect airspace for visual circling prior to landing, possibly after a descent through cloud aligned with a runway other than that in use for landing.
- b) 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.
- c) 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:
 - i. the elevations of the most frequently used altimeter setting datum points;
 - ii. minimum circling altitudes in use or required; and
 - iii. the nature of operations at the aerodrome
- d) 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.

5.3. Approach and Transitional Surfaces

- a) These surfaces define the volume of airspace that should be kept free from obstacles to protect an aeroplane in the final phase of the 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.

5.4. Take-off Climb Surface

- a) 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.

5.5. Inner Approach, Inner Transitional and Balked Landing Surfaces

- a) 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.
- b) 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%.
- c) 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.

6. Responsibilities

- 6.1. SCAA's SSRD have the basic authority and primary responsibility to establish criteria for the limitation of obstacles and to provide guidance and assistance to those directly concerned with control of obstacles.
- 6.2. The airport operators have the ultimate responsibility for limitation and control of obstacles. This includes the responsibility for controlling obstacles on airport property and for arranging the removal or lowering of existing obstacles outside the airport boundaries. The latter obligation can be met by negotiations leading to purchase or condemnation (where authorized) of air easements or title to the property.
- 6.3. Each airport manager should designate a member of his staff to be responsible for the continuing process of making sure that airport approach, departure and manoeuvring areas remain clear of obstacles which may jeopardize safety. The airport manager, or his designee, should work closely with government agencies at all levels to ensure that all possible steps have been taken to prevent erection of obstacles, including providing information to zoning authorities on the location, length, orientation and elevation of runways on which obstacle limitation surfaces are based. The airport manager must maintain constant vigilance to prevent erection of obstacles around his airport and he should alert other agencies to potential problems which may arise under their jurisdiction. In order to fulfil these obligations, the airport manager should establish a programme of regular and frequent visual inspections of all areas around the airport in order to be sure that any construction activity or natural growth (i.e. trees) likely to infringe any of the obstacle limitation surfaces is discovered before it may become a problem. This inspection programme should also include a dally observation of all obstacle lights, both on and off the airport, and corrective action in the case of light failure.

7. Establishment of obstacle limitation surfaces

- 7.1. Aerodrome operators is responsible to establish the obstacle limitation surfaces and provide SCAA SSRD, 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
- 7.2. It would be desirable to base all obstacle limitation surfaces on the most critical aerodrome design features anticipated for future development, since it is

always easier to relax a strict standard than to increase a requirement of a lesser standard if plans are changed. Some major aerodromes make a practice of attempting to protect all runways to the standards required for category III precision approaches, to maintain maximum flexibility for future development.

8. Staff competency and training

- 8.1. As per national requirements, an aerodrome operator shall employ an adequate number of qualified and skilled personnel to perform all critical activities for the operation and maintenance of his aerodrome. In this regard, for obstacle control within the aerodrome and its vicinity, the aerodrome operator is to ensure that his staff is able to perform the surveys competently through sufficient and appropriate training.
- 8.2. The aerodrome operator should put in place a formal and structured training programme for his staff involved in obstacle control. The training programme should include recurrent training so as to keep the staff updated on new knowledge and technology which may enhance his work.
- 8.3. The relevant aerodrome staff should 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.

9. Objective of obstacle control

- 9.1. The objective of obstacle control is for the aerodrome operator to ascertain that man-made structures, natural growths (e.g. trees) or aerial activities likely to infringe the OLS are discovered before they pose a danger to aircraft operations. Hence, the aerodrome operator should put in place a process of systematic and frequent obstacle surveys at his aerodrome and its vicinity. In addition, the obstacle surveys should include checks for any unauthorized construction equipment and hazardous aerial activities, which may pose a danger to aircraft operations. The aerodrome operator is to take necessary corrective actions to address any penetrations, non-compliances and / or aerial activities.
- 9.2. 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) staff 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.

10. Methods of obstacle control

10.1. 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.

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 siting 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 airport 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. One of the difficult aspects of obstacle control is the problem of anticipating new construction which may penetrate obstacle limitation surfaces. Airport operators have no direct means of preventing such developments.
- 13.2. Legislations may therefore be enacted to assign responsibility for reporting new construction projects. The obligation to report such construction may rest with local agencies such as planning bodies or construction licensing authorities or with the developer themselves. Height limits consistent with the criteria in STS-ADR may be specified, below which local authorities may authorize a project with higher review. If any part of a proposed development appears to penetrate an obstacle limitation surface, then the project should be referred to the airport operator and/or civil aviation authority for review. This review would examine the effect of the envisaged construction on air navigation in general and on operational procedures in use. If the conclusion of the above study is that the proposed construction can be permitted under some conditions, these should also be identified, e.g. display of obstacle marking and lighting, compliance with

other appropriate measures for continued safety of air navigation, etc. Finally, all concerned should be notified of the new construction through charts and through Notices to Airmen (NOTAM) or Aeronautical Information Publications (AIP) pursuant to STS-AIS.

14. Obstacle surveys

14.1. General

- 14.1.1. 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 airport operator. In the absence of a governmental survey, the airport operator should make the necessary survey with his own staff or with the assistance of a consultant or local operators.
- 14.1.2. 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.
- 14.1.3. The survey specification for the aerodrome obstacle chart Type “A” is to be obtained from SSRD’s ANSI, as it is data and information that is required to be provided for promulgation by AIS.
- 14.1.4. The airport operator should conduct periodic surveys to ensure the validity of the information in the initial survey. Furthermore, the airport 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 control programme is contemplated.
- 14.1.5. 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.

14.2. Frequency and timing of obstacle surveys

14.2.1. 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.

14.3. Calibration of equipment required for obstacle surveys

14.3.1. 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 most cases, calibration may be done in-house i.e., by the aerodrome staff. Hence, the staff should be familiar with the self-calibration process. In other cases, calibration can only be done by the manufacturer. In this regard, the equipment should be sent to the manufacturer for calibration as recommended before its due date.

14.3.2. The aerodrome staff should ensure that the equipment is properly calibrated at all times and its calibration records are retained.

14.3.3. The aerodrome staff should also ensure that there is spare equipment available, or arrangements to obtain required equipment, to be used for obstacle surveys when the main equipment is found to be unserviceable.

14.4. Conduct day of obstacle surveys

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

- a) all requirements including maximum allowable height and marking of construction equipment are being complied with at all times;
- b) no objects (e.g. construction equipment), other than those operating under an approval, are erected;
- c) markings on vehicles and other objects (e.g. construction equipment and buildings) are properly maintained;
- d) no natural growths (e.g. trees) which penetrate its allowable height;
- e) no aerial activities other than those permitted;
- f) follow-up on previous penetrations, non-compliances and / or unauthorized aerial activities, if any.

14.4.2. The aerodrome staff conducting the obstacle surveys should be aware of the developments within the aerodrome and its vicinity. He 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 staff should record down the changes and their reasons in the checklists used. Being the one to conduct the day obstacle survey, the aerodrome staff should be familiar with the area to be surveyed and the locations of sites to be checked.

14.4.3. The aerodrome staff should carry with him the following non-exhaustive items for the day survey:

- a) a copy of checklists for day obstacle survey (to be completed by staff during the survey);
- b) a copy of information on construction vehicles and equipment that has obtained an approval for operations, and other requirements;
- c) a copy of information on approved aerial activities and other requirements, if any;
- d) a copy of information on outcomes of previous surveys conducted;
- e) a copy of up-to-date obstacle charts / aerodrome maps;
- f) a copy of up-to-date street directory;
- g) binoculars;
- h) digital camera;
- i) GPS device;
- j) height measuring instrument.

14.4.4. The aerodrome staff should first make reasonable effort to assess the sites i.e. obtaining the necessary permission from and / or making necessary arrangements with the appropriate entity such as land / building owner. After doing so, if the staff is still not able to gain access to any of the sites, he should escalate it to the post holder responsible for obstacle control. Meanwhile, the staff should make use of observation points to assist him in his survey.

Survey of construction activities

14.4.5. The aerodrome staff, when on-site, should obtain documentary proof of the approval for erection of relevant objects from the person-in-charge of the construction site and verify the numbers, types and heights of construction equipment used at the site. A calibrated height measuring instrument should be used to measure the heights of all construction equipment available at the site. If height measurements of the construction equipment could not be easily taken, the staff could refer to the heights of the surrounding structures for reference.

14.4.6. In the event where a construction equipment has exceeded the approved height limit, the aerodrome staff is required to advise the person-in-charge to lower the equipment to the allowable height. If the equipment could not be lowered, the staff should immediately report the penetration to SCAA SSRD, the air traffic service units and other appropriate authorities, and promulgate a NOTAM so that aircraft operations can be conducted safely at all times.

14.4.7. In the event where the person-in-charge is not able to produce

documentary proof of approval, the aerodrome staff should advise the person-in-charge to cease operations, retract / lower equipment and seek approval before the recommencement of the operations. To facilitate the application process, the staff should provide an up-to-date copy of the application form for use of construction vehicles and equipment to the person-in-charge or refer the person-in-charge to the online application form, if applicable, for the latter to submit his application. The aerodrome staff should follow-up with the person processing the application and visit the site the next day or two to ensure approval has been sought and the person-in-charge complies with the requirements stated in the approval.

14.4.8. If the operations could not be ceased, the staff should inform the responsible post holder to ascertain if any of the equipment used has exceeded its height limit, and if yes, the staff should first advise the person-in-charge to lower the equipment and report the non-compliance accordingly. If lowering of the equipment could not be achieved, the staff should immediately report the penetration to SCAA SSRD, the air traffic service units and other appropriate authorities, and promulgate a NOTAM so that aircraft operations can be conducted safely at all times.

14.4.9. In addition to checking the approval, the aerodrome staff should verify the relevant STS requirements and conditions stated in approval. An example is the marking of the object using flags which is applicable to surveys conducted within the aerodrome as well as its vicinity. Flags should be displayed on top of, or around the highest edge of the object. It is important to note that the flags should not increase the hazard presented by the object they mark. The aerodrome staff should inspect the flags used. Binoculars should be used for this instance. Flags that are of poor conditions (e.g. faded, torn) should be replaced.

14.4.10. The following are the specifications of flags used for marking different objects:

- a) Flags used to mark the fixed objects should not be less than 0.6 m on each side and flags used to mark mobile objects, not less than 0.9 m on each side
- b) Flags used to mark fixed objects should be orange in colour or a combination of two triangular sections, one orange and other white, or one red and the other white, except that where such colours merge with the background, other conspicuous colours should be used.
- c) Flags used to mark mobile objects should consist of a chequered pattern, each square having sides of not less than 0.3 m. The colours of the pattern should contrast each with the other and with the background against which they will be seen. Orange and white or alternatively, red and white should be used, except where such colours merge with the background.

14.4.10. Another example is the markings painted on buildings and structures

located within the aerodrome. The staff should also inspect these markings during the survey. Markings that are of poor conditions (e.g. faded) should be repainted.

14.4.11. The following are the specifications of markings used for marking buildings and structures located within the aerodrome:

- a) An object should be coloured to show a chequered pattern if it has essentially unbroken surfaces and its projection on any vertical plane equals or exceeds 4.5 m in both dimensions. The pattern should consist of rectangles of not less than 1.5 m and not more than 3 m on a side, the corners being of the darker colour. The colours of the pattern should contrast each with the other and with the background against which they will be seen. Orange and white or alternatively red and white should be used, except where such colours merge with the background.
- b) An object should be coloured to show alternating contrasting bands if:
 - i. it has essentially unbroken surfaces and has one dimension, horizontal or vertical, greater than 1.5 m, and the other dimension, horizontal or vertical, less than 4.5 m; or
 - ii. it is of skeletal type with either a vertical or a horizontal dimension greater than 1.5 m.

The bands should be perpendicular to the longest dimension and have a width approximately $1/7$ of the longest dimension or 30 m, whichever is less. The colours of the bands should contrast with the background against which they will be seen. Orange and white should be used, except where such colours are not conspicuous when viewed against the background. The bands on the extremities of the object should be of the darker colour.

Note: Table 10-1 of the STS-ADR shows a formula for determining band widths and for having an odd number of bands, thus permitting both the top and bottoms to be of the darker colour.

- c) An object should be coloured in a single conspicuous colour if its projection on any vertical plane has both dimensions less than 1.5 m. Orange or red should be used, except where such colours merge with the background.
- d) When mobile objects are marked by colour, a single conspicuous colour, preferably red or yellowish green for emergency vehicles and yellow for service vehicles should be used.

14.4.12. In any event where the aerodrome staff is not able to ascertain the dimensions of the flags or the markings, he may obtain documentation proof from the person-in-charge that the flags used or the markings painted are indeed in compliance with the requirements. If the person-in-charge is not able to show any documentary proof, the aerodrome staff should advise the person-in-charge on the requirements and the replacement of the flags or the repainting of the buildings and structures, if required. The staff should report the non-compliance accordingly.

Survey of trees

- 14.4.13. In the case of natural growths (e.g. trees), agreement should ideally be reached in writing with the property owner to ensure that future growth will not penetrate the height limits thus, creating new obstacles. 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.
- 14.4.14. 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 staff 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.
- 14.4.15. If a tree was found to have exceeded its height limit, the aerodrome staff should immediately inform SCAA SSRD, 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 staff should arrange for the affected tree to be trimmed and after trimming the affected tree, the staff 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

- 14.4.16. Survey of approved aerial activities cleared should be conducted by the aerodrome staff. The staff should ensure that the aerial activities are carried out in accordance with applicable approvals. If the staff 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 staff should report the unauthorised activity to accordingly.
- 14.4.17. In the event where an unauthorised aerial activity cannot be stopped, the staff should inform the responsible post holder to ascertain if the activity has exceeded its height limit, and if yes, the staff should immediately report the penetration to SCAA SSRD, 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 staff should immediately report the unauthorised aerial activity to the responsible post holder and SCAA SSRD.

14.5. Conduct of night obstacle surveys

- 14.5.1. Night obstacle surveys within the aerodrome and its vicinity are conducted to ascertain the following:
- a) all requirements including approved maximum allowable height and lighting of construction equipment are being complied with at all times;
 - b) no objects (e.g. construction equipment) other than those approved are erected;

- c) lighting on vehicles and other objects (e.g. construction equipment and buildings) are properly maintained;
- d) no aerial activities other than those permitted are being conducted;
- e) follow-up on previous non-compliances and / or penetrations, if any.

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

14.5.3. The aerodrome staff should carry with him the following non-exhaustive items for the night survey:

- a) a copy of checklists for night obstacle survey (to be completed by staff during the survey);
- b) a copy of information on construction vehicles and equipment and other requirements;
- c) a copy of information on aerial activities and other requirements, if any;
- d) a copy of information on outcomes of previous surveys conducted;
- e) a copy of up-to-date obstacle charts / aerodrome maps;
- f) binoculars;
- g) digital camera;
- h) GPS device;
- i) height measuring instrument; and
- j) flashlight.

14.5.4. The aerodrome staff should first make reasonable effort to assess the sites i.e. obtaining the necessary permission from and / or making necessary arrangements with the appropriate entity such as land / building owner. After doing so, if the staff is still not able to gain access to any of the sites, he should immediately seek assistance from ANS Policy. Meanwhile, the staff should make use of observation points to assist him in his survey.

Survey of construction activities

14.5.5. The aerodrome staff, when on-site, should obtain documentary proof of the applicable approval from the person-in-charge of the construction site, if this was not already done during the day obstacle survey. He should verify the numbers, types and heights of construction equipment used at the site. A calibrated height measuring instrument should be used to measure the height of all the construction equipment available at the site. If height measurements of the construction equipment could not be easily taken, the staff could refer to the heights of the surrounding structures for reference. If there were no works at night, the aerodrome staff should ensure that all equipment are retracted / lowered and lighted in accordance with the requirements.

- 14.5.6. In the event where a construction equipment has exceeded the approved height limit, the aerodrome staff is required to advise the person-in-charge to lower the equipment to the allowable height. If the equipment cannot be lowered, the staff should immediately report the penetration to SCAA SSRD, the air traffic service units and other appropriate authorities, and promulgate a NOTAM so that aircraft operations can be conducted safely at all times.
- 14.5.7. In the event where the person-in-charge is not able to produce documentary proof of the approval, the aerodrome staff should advise the person-in-charge to cease operations, retract / lower equipment if works are ongoing and to seek the applicable approval before the recommencement of the operations. To facilitate the application process, the staff should provide an up-to-date copy of the application form for use of construction vehicles and equipment to the person-in-charge or refer the person-in-charge to the online application form, if applicable, for the latter to submit his application. The aerodrome staff should follow-up with the post holder responsible for obstacle control and visit the site the next day or two to ensure approval has been sought and the person-in-charge complies with the requirements stated in the approval.
- 14.5.8. If the operations could not be ceased, the staff should inform the post holder responsible for obstacle control to ascertain if any of the equipment used has exceeded its height limit, and if yes, the staff should first advise the person-in-charge to lower the equipment and report the non-compliance accordingly. If lowering of the equipment could not be achieved, the staff should immediately report the penetration to SCAA SSRD, the air traffic service units and other appropriate authorities, and promulgate a NOTAM so that aircraft operations can be conducted safely at all times.
- 14.5.9. In addition to checking the approval, the aerodrome staff should verify the relevant STS requirements and conditions stated in the approval. An example is the lighting of the object using obstacle lights. Such lights should be located as close as practicable to the top of the object. The top light should be arranged as to at least indicate the points or edges of object highest in relation to the OLS. Binoculars should be used for this instance.
- 14.5.10. The aerodrome staff should conduct checks to determine the serviceability of the obstacle lights and ensure that these lights meet the specifications 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 construction equipment or a group of construction equipment, the staff should also check if the specifications of the light stated in the STS and / or the approval are being complied with.
- 14.5.11. In any event where the aerodrome staff 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 staff should advise him on the requirements and the replacement of the lights, if required. The staff should report the noncompliance accordingly.

- 14.5.12. It is important to note that the approvals for construction vehicles and equipment may state requirements on the type of obstacle lights to be installed on vehicles and mobile objects. In any event where the requirements in the approvals differ from the STS requirements, the more stringent requirements will apply. The aerodrome staff, if uncertain, may at any time seek clarification from the post holder responsible for obstacle control or ASSI.

Survey of aerial activities

- 14.5.13. Survey of approved aerial activities should be conducted by the aerodrome staff. The staff should ensure that the aerial activities are carried out in accordance with applicable approvals. If the staff sighted any unauthorised aerial activities during the night survey that 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 for applicable approval before the recommencement of the activity. The aerodrome staff should report the unauthorised activity accordingly.

- 14.5.14. In the event where an unauthorised aerial activity cannot be stopped, the staff should inform the post holder responsible for obstacle control to ascertain if the activity has exceeded its height limit, and if yes, the staff should immediately report the penetration to SCAA SSRD, 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 staff should immediately report the unauthorised aerial activity to the post holder responsible for obstacle control and SCAA SSRD.

Survey of buildings

- 14.5.15. 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 staff 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 staff should also check if the specifications of the light stated in the STS and / or the approval are being complied with.

- 14.5.16. In any event where the aerodrome staff 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 staff should advise him on the requirements and the replacement of the lights, if required. The staff should report the noncompliance accordingly.

Survey of vehicles and mobile objects within the airside

- 14.5.17. As part of the obstacle survey within the airside, the aerodrome staff should be aware that for follow-me vehicles, low-intensity obstacle lights, Type D should be displayed as close as practicable on top of the vehicles. Such low-intensity obstacle lights should be flashing yellow and meet the specifications stated in STS-ADR.
- 14.5.18. The aerodrome staff should also be aware that for vehicles and other mobile objects within the aerodrome excluding follow-me vehicles and aircraft, low intensity obstacle lights, Type C, should be displayed as close as practicable on top of the vehicles or objects. Such low-intensity obstacle lights should be flashing-blue for vehicles associated with emergency or security and flashing-yellow for others. These lights should also meet the specifications stated in STS-ADR.
- 14.5.19. The aerodrome staff should conduct checks to determine the serviceability of the obstacle lights on vehicles and mobile objects, 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 found on the same vehicle / mobile object or other similar vehicles and mobile objects located around the same area, the staff should also check if the specifications of the light stated in the STS-ADR are being complied with.
- 14.5.20. In the event where the aerodrome staff is not able to ascertain the characteristics of the light, he may obtain documentation proof from the person-in-charge of the vehicle or mobile object that the obstacle lights installed on the vehicle or mobile object are indeed in compliance with the requirements. If the person-in-charge is not able to show any documentary proof, the aerodrome staff should advise him on the requirements and the replacement of the lights, if required. Meanwhile, the vehicle or mobile object should not be used unless the lights are replaced and have met the requirements.

14.6. Documentation and follow-ups

- 14.6.1. The aerodrome staff should take clear photographs of the sites and all construction equipment, trees, aerial activities, buildings, vehicles and mobile objects sighted during the survey. These photographs should be filed with the completed checklists.
- 14.6.2. In all cases, it is important that the aerodrome staff records down all the survey information and outcomes in the checklists as they may be used for subsequent surveys or obstacle data analysis. For 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 staff 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 SSRD / ASSI on their closures.

- 14.6.3. It is a good practice for the aerodrome staff to share the survey conducted and its outcomes with the other staff who may be conducting subsequent surveys. This sharing may be incorporated into the daily handing / taking over sessions between staff.

15. Marking and lighting of obstacles other than natural growths

- 15.5. 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.
- 15.6. 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.
- 15.7. 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.
- 15.8. 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.
- 15.9. 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.

16. Promulgation of information on obstacles

- 16.5. 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).
- 16.6. Whenever a penetration, either temporary or permanent in nature, is identified, the aerodrome operator is required to report the penetration immediately to SCAA SSRD, the air traffic service units and other appropriate authorities. To this end, the aerodrome operator conducting the obstacle surveys is

responsible to ensure that information on obstacles is promptly transmitted to the AIS. 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. It is in his best interest for the aerodrome operator to 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.

17. Obstacle data analysis and continuous improvement

- 17.5. 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.
- 17.6. 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 applicable requirements at all times.

18. Conclusion

- 18.5. A successful obstacle control process requires the collaboration of parties including but not limited to, aerodrome operator, regulator, other authorities, property / construction site owners and the general public. Such collaboration should provide a safe environment for efficient and safe operation of aircraft near the aerodrome. In this regard, the aerodrome operator should also constantly engage the relevant parties to ensure that the established process is a robust and effective one.

19. Queries

- 19.5. Any queries relating to this Aerodrome Notice should be addressed to Head of Aerodrome Safety & Standards Inspectorate on seyaga@scaa.sc

**Aerodrome Safety & Standards Inspectorate
Seychelles Civil Aviation Authority**