



NAMIBIA CIVIL AVIATION AUTHORITY

Advisory Pamphlet (AP)

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**OPERATIONAL SAFETY DURING WORKS ON
AERODROME**

Explanation of Advisory Pamphlets (AP) system.

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Advisory Pamphlets are intended to provide information and guidance to illustrate a means but not necessarily the only means of complying with the Regulations or to explain certain regulatory requirements by providing interpretative and explanatory material. Where an AP is referred to in a 'Note' below the regulation, the AP remains as guidance material.

APs should always be read in conjunction with the referenced regulations.

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- 2. Effective date:** 11/11/2022


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Table of Contents

1. Introduction and Background	4
1.1. Introduction	4
1.2. Background.....	5
1.3. Purpose	5
1.4. Applicability.....	5
1.5. Description of Amendments	6
2. Requirements and References.....	6
2.1. Regulatory reference	6
2.2. Reference documents	6
3. Aerodrome Works	7
4. Management and Control of Aerodrome Works	10
5. Aerodrome Works Safety Plan	16
Appendix 1:	22
Appendix 2:.....	24
Appendix 3:.....	35

1. INTRODUCTION AND BACKGROUND

1.1. Introduction

The operator of a certified or licensed aerodrome must arrange aerodrome works to ensure that it does not endanger aircraft operations or create a hazard to aircraft. The aerodrome manual must include particulars of the procedures for planning and safely carrying out aerodrome works. Aerodrome works may be carried out without the closure of the aerodrome, provided safety precautions are adhered to. Aerodrome works may be carried out in the following manner:

- (a) where the works are of a nature that will disrupt aircraft operations, they must be carried out under a proper aerodrome works safety plan; and
- (b) where works are of a maintenance nature, the work must be carried out as time-limited works.

Where a threshold is required to be temporarily displaced by more than 300 m due to aerodrome works, the aerodrome operator must carry out an aeronautical study to assess the operational significance of that displacement.

1.2. Background

The NAMCARs, Part 139.08.16 requires an operator of a certified or licensed aerodrome to establish procedures for ensuring that any works carried out on the aerodrome, do not endanger aircraft operations.

NAMCARs, Part 139.08.16 further requires an operator of a certified or licensed aerodrome to comply with the standards prescribed in NAMCATS-AH in relation to works safety plan and notice requirements that must be satisfied before aerodrome works may be carried out.

NAMCARs, Part 139.08.16 states that the aerodrome operator must not carry out aerodrome works, other than time-limited works, without a works safety plan that sets out the arrangements for carrying out those works.

1.3. Purpose

This Advisory Pamphlet (AP) provides guidance to aerodrome operators on procedures to be followed to ensure the safety of aircraft operations during aerodrome works to meet the requirements of the NAMCARs, Part 139 and the associated technical standards.

1.4. Applicability

This advisory pamphlet is applicable to all aerodromes in Category A, Category B and Category C. However, this advisory pamphlet is also recommended for implementation by aerodromes under Category D and E in the interest of aviation safety.

1.5. Description of Amendments

There are no amendments.

2. REQUIREMENTS AND REFERENCES

2.1. Regulatory reference

- NAMCARs, PART 139.08.16

2.2. Reference documents

- Namibia Civil Aviation Regulations (NAMCARs) 2018

3. AERODROME WORKS

3.1. Introduction

NAMCARs, Part 139.08.16 requires an aerodrome operator to establish procedures for ensuring that any works carried out on the aerodrome do not endanger aircraft operations or create a hazard to aircraft.

NAMCARs, Part 139.08.16 also requires an operator of a certified or licensed aerodrome to prepare an aerodrome works safety plan that sets out the arrangements for carrying out major works at those aerodromes. NAMCARs, Part 139.08.16 further requires the operator of a certified or licensed aerodrome to submit a copy of the works safety plan, and any alteration thereof, to the Executive Director, as soon as possible after the plan is prepared or altered and before works can commence.

The aerodrome operator is responsible for establishing safety requirements and procedures for works on the aerodrome, including controlling any work in progress, to ensure those works do not endanger aircraft operations or create a hazard to aircraft.

This Advisory Pamphlet (AP) provides guidance to the operators of certified or licensed aerodromes to enable them to establish procedures to meet the requirements of the regulations when carrying out works at the aerodrome. This AP also provides information to enable the aerodrome operator to prepare an aerodrome works safety plan that is acceptable to the Executive Director.

A works safety plan is not required if the aerodrome operator closes the aerodrome to aircraft operations while aerodrome works are being carried out. A sixty (60) days notice of intention to close the aerodrome must comply with NAMCARs, Part 139.01.7 to ensure that the NCAA, air traffic services, air operators and all organisations and persons likely to be affected by the closure are notified in advance.

The operator must not close the aerodrome to aircraft operations due to aerodrome works unless a NOTAM giving notice of the closure has been issued not less than 14 days before closure takes place.

A works safety plan is not required for emergency aerodrome works carried out to repair unforeseen damage to part of the manoeuvring area, or to remove an obstacle, or if the works do not require any restrictions to aircraft operations. Where practicable, a NOTAM, giving the time and date of the commencement of the works must be issued, as early as possible, but preferably not less than 48 hours before commencement of the works.

3.2. Preparation of aerodrome works safety plan

At a certified or licensed aerodrome, unless the aerodrome is closed during aerodrome works, or the work is of an emergency nature, the aerodrome operator must not carry out aerodrome works, other than time-limited works, without a Works Safety Plan. The works safety plan sets out the arrangements for carrying out those works.

When preparing a works safety plan, an aerodrome operator must consult:

- (a) commercial air transport operators using the aerodrome;
- (b) air traffic services units;
- (c) the rescue and fire fighting service unit at the aerodrome if the works safety plan may affect its operations;
- (d) the works contractor (to provide a work methodology statement).

The aerodrome operator must submit a copy of the works safety plan (including the work methodology statement), and any alteration thereof, to the Executive Director, as soon as possible after the plan is prepared or altered and before works can commence.

The aerodrome works safety plan must be presented in sections in the following sequence as described in section 6 of this AP:

- (a) Title page
- (b) Works information
- (c) Restrictions to aircraft operations and issue of NOTAMs
- (d) Restrictions to works organization
- (e) Risk assessment and mitigation measures
- (f) Risk assessment after mitigation measures
- (g) Administration
- (h) Authority
- (i) Drawings
- (j) Distribution list

3.3. Appointment of an aerodrome works safety officer

An aerodrome operator shall appoint a works safety officer to coordinate the carrying out of major works at the aerodrome. The aerodrome operator should ensure that the person appointed as an aerodrome works officer is appropriately qualified to perform the functions of this position. The functions of the works safety officer are described in Appendix 1 of this AP.

4. MANAGEMENT AND CONTROL OF AERODROME WORKS

4.1. Introduction

An aerodrome operator is responsible for controlling any work in progress at an aerodrome. The aerodrome operator is also responsible for establishing the safety requirements and procedures.

Persons authorized to enter active parts of the movement area and all vehicles, plant and equipment required for carrying out aerodrome works are subject to clearance from Aviation Security and must comply with any rules developed by the aerodrome operator for the conduct of routine tasks at the aerodrome such as grass cutting and sweeping.

The magnitude of works on aerodromes can vary from major (e.g. runway reconstruction), to minor (e.g. grass cutting), and application of the requirements may be less formal for smaller activities. Regardless of the size and complexity of the work, it must always be carried out safely and with minimal disruption to the operation.

The project manager has the responsibility to coordinate all works and should:

- (a) make arrangements and establish procedures for the safety of aircraft operations while the works are in progress; and
- (b) ensure these arrangements and procedures are published in the Works Safety Plan; and
- (c) ensure the works are carried out according to the Works Safety Plan; and
- (d) ensure NOTAMs are issued to give notice of the works; and
- (e) appoint a person (or persons) as works safety officer to carry out the functions set out in Appendix 1; and
- (f) periodically review the Works Safety Plan and adjust when necessary to maintain its effectiveness.

Matters that need to be considered to ensure adequate control of works on an aerodrome include:

- (a) developing a work programme; and
- (b) scheduling work for minimal disruption to aerodrome operations; and
- (c) identifying potential safety issues and developing mitigation plans; and
- (d) establishing a structure to oversee activities; and
- (e) developing a programme to monitor work activities; and
- (f) carrying out the work; and
- (g) continuing oversight for compliance with established plans and procedures; and
- (h) implementing remedial actions where necessary; and
- (i) reviewing plans and processes periodically for effectiveness; and
- (j) inspecting the work and work-site to verify completion, and to ensure no hazards exist.

Appendix 2 to this AP provides general guidance on the procedures to be applied during aerodrome works.

Appendix 3 to this AP provide guidance on dealing with temporary hazards posed by work activities on or adjacent to aerodrome movement areas and which may interfere with the safety of aircraft operations.

4.2. Time-Limited Works (Minor works)

Aerodrome works may be carried out as time-limited works if normal aircraft operations are not disrupted.

Time-limited works include the following works:

- (a) maintenance of markings and lights;
- (b) grass mowing;
- (c) rolling surfaces;
- (d) sweeping pavements;
- (e) minor repairs to pavements; and
- (f) surveys and inspections

All personnel involved in minor construction or maintenance work should be fully briefed on the aerodrome operator's requirements that control working on the aerodrome, including obtaining clearance from an aerodrome air traffic services unit if present.

The aerodrome operator can authorize personnel regularly carrying out routine maintenance (e.g. grass cutting), to work on the aerodrome without further briefing, subject to continuing compliance with the work control requirements/procedures.

For time-limited works, a dedicated works safety officer is not required if one of the persons carrying out the time-limited work has been trained to perform the function of the works safety officer.

4.3. Restrictions on carrying out Time-Limited Works

Time-limited works must not be carried out at night or if visibility is less than 5 kilometres, except at a controlled aerodrome if the area can be restored to the required safety standards to allow aircraft operations to take place without delay.

The aerodrome operator's work control system should be developed to ensure that:

- (a) no work takes place on the active movement area without the knowledge of either the aerodrome operator or air traffic service unit;
- (b) permitted times of work are strictly followed; and
- (c) all individuals taking part in the work are briefed in detail on the following —
 - (i) precise areas in which the work may be done;
 - (ii) the routes to be followed to and from the work area;
 - (iii) the radiotelephone or other control procedures to be used, the maintenance of a radio listening watch, and the use of look-outs;
 - (iv) the safety precautions to be observed;
 - (v) the reporting procedure to be followed on completion of the work; and
- (d) at the concluding the work, the aerodrome operator must inspect the work area to ensure that it has been left in a safe condition before the scheduled or notified time of an aircraft operation;

Time-limited works must be stopped and normal safety standards restored, when required to allow an aircraft operation to take place.

At an uncontrolled aerodrome, works that have been stopped to allow the restoration of normal safety standards may be resumed:

- (a) if stopped for an aircraft arrival, immediately after the arrival, if the safety of the aircraft is not endangered by the resumption; or
- (b) if stopped for an aircraft departure, 15 minutes after the departure has taken place; or
- (c) if stopped for an aircraft arrival that does not take place; 30 minutes after the time scheduled or notified for the arrival (when a new ETA is established).

4.4. Major Works

The aerodrome operator should establish an Aerodrome Works Safety Plan before commencing any major construction work on the aerodrome unless the runway is closed during construction. The aerodrome operator must ensure that works are carried out in a manner that will ensure the safety of aircraft operations.

The aerodrome operator shall:

- (a) appoint a project manager with overall responsibility for maintaining the works safety plan and ensuring the work is carried in accordance with its requirements. The project manager shall make arrangements and establish procedures for the safety of aircraft operations while the works are in progress;
- (a) ensure that the major works at the aerodrome are carried out in accordance with the Works Safety Plan;
- (b) ensure that a NOTAM is issued to give notice of the works; and
- (c) appoint a person in writing as a works safety officer in accordance with Section 4.3 of this AP to carry out the functions set out in Appendix 1 to this AP;

The aerodrome operator shall ensure that the person appointed as an aerodrome works safety officer is present at all times if aerodrome works are being carried out and the aerodrome is open to aircraft operations.

The works safety officer shall make arrangements and establish procedures for the safety of aircraft operations while the works are in progress. These arrangements and procedures should be published in the works safety plan.

All persons, vehicles, plant and equipment required for carrying out aerodrome works, should not be permitted to enter the movement area or remain on it, except for the purpose of carrying out those works. The procedures for entering works areas and the routes to be followed to access the work areas must be clearly stated in the works safety plan.

5. AERODROME WORKS SAFETY PLAN

The aerodrome works safety plan should be a written document, properly controlled and authorised, and made available to all parties involved with the works. The contents and level of detail should be adjusted as necessary to properly reflect the requirements for each project.

5.1. Title Page

The Title should include:

- (a) the aerodrome name; and
- (b) the title of the works; and
- (c) a brief description of the works if required; and
- (d) the Plan issue date and, if necessary, its amendment status.

Each Works safety plan must be given a reference number given to the plan by the aerodrome operator (e.g. FYWB2101 – *meaning works safety plan number 01, for Walvis Bay International Airport during the year 2021*).

Works safety plans issued in relation to the same aerodrome must be numbered consecutively in the order of their issue.

The Plan number, the date of issue, and the date and number of any amendment are to be set out in the top right-hand corner of the title page.

The title must indicate the location of the work and give a short description of the project, for instance “[name of aerodrome]: runway 07/25 repairs”.

The date of approval of the Plan, the date of commencement and the date of expiry of the Plan, and the date of completion of the works are to be set out on the title page

The title page must include a list of the sections of the Works Safety Plan.

5.2. Works Information

The Works Safety Plan should include:

- (a) an outline of the full scope of the works;
- (b) which aerodrome facilities are affected;
- (c) the planned date and time of commencement;
- (d) the duration of each stage;
- (e) the date and time of completion; and
- (f) the following statement:

“The actual date and time of commencement will be advised by NOTAM, to be issued not less than 48 hours before the work commences”.

5.3. Restrictions to Aircraft Operations and Issue of NOTAMS

This section of the Works Safety Plan should be in a form that allows its separate issue to aircraft operators and permits those operators to have easy reference to the information as it affects them.

This section of the Plan must state each restriction and each aircraft type affected by that restriction.

Work Stages

Any restrictions to aircraft operations on the manoeuvring area, or in the approach and take-off areas that are to be listed in the works safety plan should be shown in drawings of each stage of the works. When appropriate, show wingtip clearances so that works safety officers can readily identify risk areas during works.

When complex works are being undertaken, a table showing the restrictions applicable to each stage of the works and for each type of aircraft operation should be included.

The table should outline the various work stages with start and completion dates and have a remarks column to list details of special restrictions and the issue of NOTAMs for the information of a pilot before a flight.

Emergencies and Adverse Weather

The Plan should outline details, if any, of special arrangements to be made during works if emergencies or adverse weather conditions occur.

NOTAMs

The intended text of all planned NOTAM associated with the aerodrome works should be included.

5.4. Restrictions to Work Organisation (Contractor)

The Plan should provide details of any restrictions on the carrying out of aerodrome works and requirements for the restoration of normal safety standards.

Personnel and Equipment

When personnel and equipment are required to vacate the movement area for certain operations, a specific mention of this fact should be made. This should include the withdrawal line or area for personnel and equipment, and the limitation on stockpiling of material, excavations, etc.

Access

The Plan must identify the routes to and from the works area and the procedures for entering the works areas within the movement area.

Particulars of routes to and from the works area must be shown in drawings attached to the Plan.

Aerodrome Markers, Markings and Lights

Details of arrangements for the installation, alteration and removal of aerodrome markers, markings and lights in the work areas and other areas affected by the aerodrome works must be shown in the drawings attached to the plan.

Protection of Electrical Services

The Plan must set out the procedures for ensuring that utilities, electrical services and control cables are not damaged.

Special Requirements

The Plan should provide details of any special requirements arising during or on completion of aerodrome works, for example, arrangements for leaving pavement surfaces swept and clean before leaving the works area, leaving bare soil compacted or protected from erosion, etc.

5.5. Risk assessment and mitigation measures

The work safety plan should provide details of all the risks expected to occur during works on aerodrome and their mitigation measures. This risks should outline their severity and probability of happening in terms

5.6. Administration

The works safety plan should provide the name of the project manager and the works safety officer(s) appointed by the aerodrome operator and the means of contact, including contact outside normal working hours.

5.7. Authority

Each works safety plan should contain the following statement: *“This Works Safety Plan is authorised by [aerodrome operator] and all works will be carried out in compliance with these requirements.”*

- Each works safety plan should set out its expiry date, and any alteration of that date.
- Each works safety plan should be signed, by the aerodrome operator or the project manager.

5.8. Drawings

Drawings should be attached, which provide a visual reference for each stage of the works.

The drawings must contain specific details including:

- (a) works area;
- (b) restrictions to aircraft, location of radio navigational aids and critical areas around these;
- (c) the exact location of visual aids and markings;
- (d) details of the height and location of critical obstacles;
- (e) location of temporary taxiways;
- (f) access routes;
- (g) storage areas for material and equipment;
- (h) the location of utilities, electrical services and control cables which may be disturbed during the works.

5.9. Distribution list

The distribution list of the works safety plan must include at least the following persons and organisations:

- (a) the project manager,
- (b) the works safety officer;
- (c) the aerodrome security manager, if any;
- (d) the aerodrome air traffic service unit, if any;
- (e) the rescue and fire fighting service for the aerodrome, if any;
- (f) regular air transport operators who might be affected by the aerodrome works to be carried out; and
- (g) aircraft operators based at the aerodrome;
- (h) contractors and subcontractors, if any.

APPENDIX 1: FUNCTIONS OF THE AERODROME WORKS SAFETY OFFICER

1. Introduction

The works safety officer is responsible for monitoring all activities on and around the works area, identifying issues or potential issues for safe aircraft operations, and initiating effective corrective actions.

2. Functions

The functions of the Works Safety are to:

- (a) Ensure the safety of aircraft operations in accordance with the standards for aerodrome works and the applicable works safety plan;
- (b) Ensure that, where applicable, the aerodrome works are notified by issuing of a NOTAM and that the text of each NOTAM is exactly as set out in the applicable works safety plan;
- (c) Where applicable, advise the aerodrome air traffic service unit, on a daily basis, with whatever information is necessary to ensure the safety of aircraft operations;
- (d) Discuss with the project manager, on a daily basis, any matters necessary to ensure the safety of aircraft operations;
- (e) Ensure that unserviceable portions of the movement area, temporary obstructions, and the limits of the works area are correctly marked and lit in accordance with prescribed standards, and the applicable works safety plan;
- (f) Ensure that the vehicles, plant and equipment carrying out aerodrome works are properly marked and lit or are under works safety officer supervision or within properly marked and lit works area;

- (g) Ensure that all other requirements in the works safety plan relating to vehicles, plant, equipment and materials are complied with;
1. Ensure that access routes to work areas are in accordance with the applicable works safety plan and are clearly identified, and that access is restricted to these routes;
 2. Ensure that excavation is carried out in accordance with the works safety plan to;
 - (i) avoid damage to any utility, underground power or electrical cable or other services;
 - (ii) avoid loss of calibration of any precision approach and landing system or any other aid navigation;
 3. Report immediately to the aerodrome air traffic service unit and the aerodrome operator, any incident, or damage to facilities, that may affect air traffic services or the safety of aircraft;
 4. Remain on duty at the works area while work is in progress and the aerodrome is open to aircraft operations;
 5. Ensure that the aerodrome air traffic service unit is kept informed of the radio call signs of the vehicles used by the works safety officer;
 6. Require the immediate removal of vehicles, plant and personnel from the movement area where necessary for the safety of aircraft operations;
 7. Ensure that the movement area is safe for normal aircraft operations following removal of vehicles, plant, equipment and personnel from the works area;
 8. Ensure that floodlighting or any other lighting required for carrying out aerodrome works is shielded so as not to present a glare to pilots.

APPENDIX 2: GENERAL GUIDANCE ON THE PROCEDURES TO BE APPLIED DURING AERODROME WORKS

CONTROL OF WORKS

1. Coordination

- 1) Before the commencement of any substantial work on the aerodrome, a coordination process should be established between representatives of:
 - (a) the aerodrome operator; and
 - (b) the aerodrome air traffic service unit, if provided; and
 - (c) the major aerodrome users; and
 - (d) the contractor who is to do the work; and
 - (e) other involved or affected parties as necessary

- 2) It would be useful to set up a committee composed of representatives of the various parties. The primary focus of this committee should be the identification of interface problems including communication problems between the various parties.

2. General working rules

Before work commences agreement should be established on general rules for working on the aerodrome: These should include -

- (a) the permitted hours of work;
- (b) the authorized routes to be followed to and from work areas;
- (c) the areas in which work may be done)
- (d) the control of vehicles;
- (e) the communication equipment to be used and the associated procedures;

- (f) the permitted heights of vehicles and equipment, and the limitations to be placed on operating heights of tall equipment such as crane jibs, etc.; and
- (g) any limitation on the use of electrical or other equipment that might interfere with navigation facilities or aircraft communications or pose any other risk to aircraft safety.

OPERATIONAL ISSUES

1. Introduction

When planning any work on an aerodrome a number of matters need to be considered to ensure the work can be completed with minimal disruption to aerodrome operations. The issues considered below should generally cover most work, but further items may be identified during the detailed planning process.

2. Isolation of work area

- 1) As far as practicable, working areas should be blocked off from the active movement areas by physical barriers. These barriers serve to warn pilots and to preclude work vehicles from inadvertently straying onto each other's active movement areas.
- 2) The barriers should be marked for day use and adequately lit for night use. The lights of taxiways leading into working areas should permanently be off during the work period.

3. Paved area cleanliness

- 1) Where work is conducted on or involves traversing, paved areas the paving should be thoroughly inspected before being opened for aircraft use. Particular attention should be paid to the presence of debris and the general cleanliness of the surface.
- 2) Where aircraft are constantly using areas open to the construction activity, inspection should be regularly done to ensure that the necessary cleaning has been carried out.

4. Markers, Marking and lighting

- 1) Aerodrome markers, markings and lights required for or affected by, aerodrome works must be installed, altered or removed .
- 2) Parts of the movement area that are unserviceable as a result of aerodrome works being carried out must be marked and lit.
- 3) All obstacles created as a result of aerodrome works being carried out must be marked and lit.
- 4) Vehicles and plant used in carrying out aerodrome works must be marked. In addition vehicles and plant used in carrying out aerodrome works at night must be lit.
- 5) Tall equipment such as crane jibs should be marked and, if the aerodrome is open for night operations, should be lit.
- 6) If work is of prolonged duration, a constant watch should be maintained to ensure that the markings and lighting of obstacles and unserviceable areas are in serviceable condition. This is particularly important for marking and lighting arrangements to indicate a displaced threshold.

5. Electronic facilities

- 1) Equipment in the vicinity of electronic equipment, for example, instrument landing systems and radars, can adversely affect the performance of these facilities.

- 2) Close cooperation between the aerodrome operator, the facility operator and contractors must be established and maintained to ensure that, if entry to critical protected areas around these facilities is necessary, measures are in place to maintain the integrity of the service or to remove the facility from service.

6. Effect on operating limits

The effect of high equipment, such as crane jibs, on ILS and radar, will need to be considered, in conjunction with those responsible for electronic landing aids, and steps taken to reduce interference to the minimum. Construction equipment may have adverse effects on obstacle clearance limits and should be considered when working plans are being formulated.

7. Obstacle surfaces

Construction equipment, particularly high equipment such as cranes, may breach obstacle clearance limits and the effects of this should be considered when working plans are being formulated.

8. Work activity on or adjacent to aerodrome movement areas

Suggested procedures for dealing with temporary hazards on or adjacent to aerodrome movement areas are given in Appendix 3. It provides guidance material that should be used when preparing plans and specifications for work activities to be conducted in areas that may interfere with aircraft operations.

9. Communication Equipment

- 1) At a controlled aerodrome, a vehicle used by a works safety officer while supervising aerodrome works must be equipped with a radio for two-way communication with Air Traffic Control;
- 2) For the purpose of communication with Air Traffic Control, each vehicle used by a works safety officer must be given a call sign;
- 3) Any vehicle or plant that is not:
 - (a) marked or lit in accordance with section 4 above; or
 - (b) if applicable, equipped with a two-way radio;

may only be used in carrying out aerodrome works if it is:

- (i) used under the direct supervision of the works safety officer; or
- (ii) used only within the limits of appropriately marked and lit works areas.

10. Reduction of runway distances

Work activity off the end of any runway, stopway, clearway or safety area could reduce the runway distance available for aircraft operations if the equipment used penetrates the obstacle free surfaces. In these cases, it is essential to provide the aircraft operators with accurate revised runway effective operational lengths and if the runway serves aircraft in excess of 5700 kg MTOW, the height and location of the temporary obstructions associated with the work should also be provided.

11. Notification of work

- 1) If the work restricts the availability of a runway or reduces the runway length available, atleast 60 days notice should be given to the aerodrome's regular air operators. These air operators plan their schedules well ahead and need sufficient time to study the effect of reduced runway distances, or restrictions on the use of the runway, on their loading and scheduling of operations.

- 2) The Aeronautical Information Services should be provided with details of the work, including any limitations and restrictions applicable to aircraft operations, for early promulgation of an AIP supplement, giving at least 3 months' notice to aircraft operators.

OPERATIONAL SAFETY

1. Introduction

Safety issues addressed in this advisory circular are primarily related to aerodrome operations. They are not intended to cover workplace health and safety requirements for personnel. All work on aerodromes must comply with any health and safety legislation applicable in Namibia.

2. Personnel safety

- 1) Construction personnel should be warned, in writing, of possible hazards when working on aerodromes. Jet-blast and noise can be aerodrome-specific hazards to be taken into account for managing personal safety, if necessary. Where necessary, a radio to listen out for unmanned aerodromes and ATC to advice for manned aerodromes.
- 2) Protective equipment including high visibility clothing must be worn by all personnel.

3. Safety considerations

The following is a partial list of matters that could affect operational safety during aerodrome works. These, plus any other matters that may be identified, should be considered when planning and carrying out the work:

- (a) Minimum disruption of standard operating procedures for aircraft operations;
- (b) Clear routes from rescue and firefighting stations to active aerodrome movement areas;
- (c) A procedure for notification, and authority to change safety-oriented aspects of the construction plan;

- (d) Initiation, currency, and cancellation of NOTAM;
- (e) Suspension, or restriction, of aircraft activity on aerodrome movement areas;
- (f) Runway end or threshold displacement, or both, and appropriate temporary lighting and marking;
- (g) Installation and maintenance of temporary lighting and marking for closed, or diverted, aircraft routes on the aerodrome movement areas;
- (h) Revised vehicular control procedures, or additional equipment and personnel;
- (i) Marking and lighting of construction equipment;
- (j) Parking of construction equipment and storage of material, when not in use;
- (k) Designation of responsible representatives of all involved parties, and their availability;
- (l) Location for construction personnel vehicle parking and their transportation to and from the worksite;
- (m) Marking and lighting of construction areas and obstructions;
- (n) Location of the construction offices;
- (o) Location of the contractor plant;
- (p) Designation of waste areas and disposal of waste;
- (q) Debris cleanup responsibilities and schedule;
- (r) Conspicuous identification of construction personnel and equipment;
- (s) Location of haulage roads;
- (t) Security control of temporary gates and relocated fences;
- (u) Noise pollution;
- (v) Explosives regulation and control;
- (w) Dust, smoke, steam, and vapour controls;
- (x) Location of utilities;
- (y) Provision of temporary utilities or immediate repairs, or both, in the event of a disruption to the established utilities;
- (z) Location of power and control lines for electronic visual navigation aids;

- (aa) Additional security measures necessary, if it is a security designated aerodrome;
- (bb) Marking and lighting of closed aerodrome movement areas
- (cc) Phasing of work;
- (dd) Protection or shutdown of aerodrome electronic and visual aids to navigation;
- (ee) The need to notify the rescue and firefighting unit when working on water supplies;
- (ff) Provision of air traffic controllers, aircraft marshallers, wing walkers, etc. to assure clearance in construction areas;
- (gg) Provision of escort with "Follow Me" vehicles for route guidance.

OVERSIGHT OF WORKS

1. Introduction

An oversight inspection programme for all aerodrome works should be implemented to:

- (a) provide continuous monitoring to ensure ongoing compliance with established safety and other requirements; and
- (b) identify any safety hazards or deviations from requirements; and
- (c) ensure remedial action to maintain safety and compliance with requirements is implemented.

2. Inspection

- 1) Frequent inspections should be made by the aerodrome operator or a representative during all phases of the work to ensure that the work is being carried out in accordance with the prescribed works safety plan.
- 2) The inspections should also ensure that no foreign object debris (FOD) is present in operational areas.
- 3) Any potential hazard should be brought to the attention of the responsible parties for immediate rectification. Where appropriate, the aerodrome air traffic services unit, if provided, or aircraft operators should be notified of the hazard.

3. Examples of hazardous and marginal conditions

Analysis of past accidents and incidents has identified many contributory hazards and conditions. The most recurring threats to safety during construction that should be watched carefully include:

- (a) safety encroachments;
- (b) improper ground vehicle operations; and
- (c) unmarked or uncovered holes and trenches in the vicinity of aircraft movement surfaces.

Some of the more commonly occurring conditions are:

- (a) excavation adjacent to runways, taxiways, and aprons;
- (b) stockpiles of earth, construction material, temporary structures, and other obstacles in proximity to aerodrome movement areas and runway approach and take-off surfaces;
- (c) runway work resulting in lips greater than 25 mm on the runway surface, and greater than 76 mm between old and new surfaces at runway edges and ends;

- (d) heavy equipment operating or idle near aerodrome movement areas;
- (e) equipment or material that may degrade the performance or integrity of radio navigation aids near the facility;
- (f) tall but relatively inconspicuous objects, such as cranes, drills, etc. in critical areas, for example, safety areas and runway approach and take-off surfaces;
- (g) improper or malfunctioning lights or unlighted aerodrome hazards;
- (h) holes, obstacles, loose pavement, rubbish, or other debris, on or near movement areas; and
- (i) failure to maintain barriers and fences to prevent unauthorised access during construction;
- (j) improper marking or lighting of runways, taxiways, and displaced thresholds;
- (k) attractions for birds from exposed earthworks, rubbish, grass seeding, ponded water, etc. on or near the aerodrome;
- (l) inadequate or improper methods for marking temporarily closed movement areas including improper and unsecured barricades; and
- (m) obliterated markings on active movement areas.

4. Completion of work

On the completion of aerodrome works and the restoration of normal safety standards to the movement area, the aerodrome operator must cancel any NOTAM issued to advise of those works.

APPENDIX 3: PROCEDURES FOR DEALING WITH TEMPORARY HAZARDS ON OR ADJACENT TO THE AERODROME MOVEMENT AREAS DURING AERODROME WORKS

1. Introduction

1. This appendix contains requirements for dealing with temporary hazards on or adjacent to the aerodrome movement area.
2. The term *temporary hazard* includes construction and maintenance work in progress adjacent to aerodrome movement areas and any plant, machinery and material associated with such work. It also includes aircraft immobilised near runways and works associated with their recovery.
3. The following guidelines can be adapted to the needs of a particular project and not incorporated verbatim into project specifications.

2. Responsibility

The prime responsibility for determining the degree of hazard and the extent of acceptable obstacles rests with the aerodrome operator, who should take into account the following:

- (a) Available runway length and the associated obstacle limitation surfaces.
- (b) Types of aircraft using the aerodrome and distribution of aircraft movements.
- (c) Whether or not alternative runways are available.
- (d) The possibility of cross-wind operations, bearing in mind seasonal variations.
- (e) The weather conditions are likely to prevail at the time, such as visibility and precipitation. The latter is significant as it adversely affects the braking coefficient of the runway, and thus an aircraft's controllability during ground run.

- (f) The possibility of a compromise between a reduction in runway length and some degree of obstacle infringement in the established take-off climb and approach surface.
1. Significant obstacles in the take-off flight path area and any reduction in the runway effective operational lengths must be promulgated by NOTAM.
 2. All temporary hazards should be marked and lit in accordance with prescribed standards for marking and lighting of obstacles.

3. Work zones

The following zones may be established around runways when the use of the runway is permitted to continue whilst works are carried out. Outside the zones, no restrictions need to be applied other than maintaining the normally required obstacle free surfaces.

Zone 1. This zone is rectangular. It symmetrically surrounds the runway. Its sides are 45 m from the runway centreline and its ends 60 m beyond the runway ends.

Zone 2. The ends coincide with the ends of Zone 1, except that where there is a clearway the end is extended to include it. The sides are 75 m from the runway centreline.

Zone 3. This zone is only required at aerodromes having a runway strip wider than 150 m. It extends to the edge of the runway strip that is 110 m or 150 m from the runway centreline where appropriate.

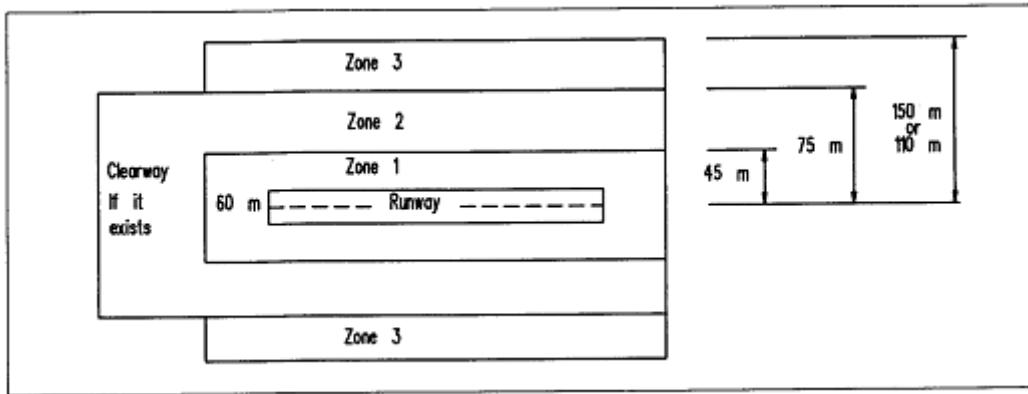


Figure 1. Zones surrounding a runway

4. Control of personnel, equipment and vehicles

- 1) All drivers and works personnel should be briefed on their responsibilities, and the procedures that must be followed. Consider whether it is appropriate to escort with “Follow Me” vehicles as an option.
- 2) Vehicles carrying gravel should not be permitted on runways or taxiways without prior permission, and anything dropped should be immediately swept up.
- 3) Air traffic services should advise pilots on approach, or before take-off, when personnel will be working at a particular location within the runway strip area. This is in addition to normal NOTAM action.

5. Work on runways or runway strips

The following procedures should be observed when the runway is in use.

Zone 1. Personnel and light-weight frangible equipment used in the calibration of landing aids may be left in a position clear of any aircraft movements. Vehicles, equipment, and personnel, engaged in the work, should be moved to one side of the runway:

- (a) For turbojet movements, to the outer edge, or clear of, Zone 2.
- (b) For other aircraft movements, to the outer edge, or clear of, Zone 1.

Zone 2. All equipment and personnel should be at the outer edge, or clear of, Zone 2 except that work may continue without interruption during the movement of aircraft other than turbojets when the crosswind is less than 10 kts.

Zone 3. The only consideration in this zone is to identify whether the presence of work equipment and vehicles could interfere with the integrity of the electronic approach aids. If such an area is identified, equipment and vehicles should be cleared from the area when the electronic approach aids are being used by an approaching aircraft.

6. Work on taxiway or taxiway strips

When the taxiway is in use, vehicles, equipment, and personnel should be moved to give a wingtip clearance of at least 10 m. The distance from a taxiway for wingtip clearance will vary significantly depending on aircraft type. For example, a Boeing 747 has a wingspan of 60 m while a commuter aircraft may be 25 m. When practical and appropriate, wingtip clearance (of expected aircraft) near works can be marked on site, or on plans, sufficient for works staff to be aware of the clearance required.

7. Work on approach lighting area

- 1) The procedures for work in Zones 1 and 2 detailed in section 5 of this Appendix apply for work on the approach lighting in those areas.
- 2) For work outside the zones, vehicles and equipment should not intrude above the plane of the approach lights. If any equipment does it should be withdrawn when the runway is in use, unless the runway threshold has been displaced to allow for its height.

8. Trenching work

The following requirements for trenching work are in addition to those detailed in section 5 of this Appendix.

Zone 1. Work should be limited to one side of the runway at a time, and excavation of any trench should be limited as follows:

- (a) A trench may be open with a maximum width of 300 mm but the open area of the trench should not exceed 9 m², for example, 300 mm x 30 m or 200 mm x 45 m.
- (b) When the trench lies almost parallel with a runway, or is within 10 degrees on either side of runway alignment, a second trench at right angles to, and extending from the first trench to Zone 2, may be open to a maximum width of 200 mm.
- (c) During aircraft movements, any open trenches within 10 m of the runway edge should be covered with load-bearing steel plates. They should be adequately held on the ground and marked by securely fixed cones at a maximum spacing of 6 m. The plate covering should exceed the dimensions of the excavation by a minimum of 150 mm on all sides. If this cannot be done the runway should be closed.

The following additional conditions apply if there are night operations:

- (a) Any trench should be backfilled and consolidated before ceasing work for the day. A maximum length of 3 m may be left unfilled but covered overnight and marked with red obstruction lights.
- (b) Any materials not associated directly with the work in progress should be removed from the zone during the period of aircraft operations.
- (c) Spoil removed from a trench should be located on the side away from the runway and the maximum height should not exceed 200 mm. For trenches, at right angles to the runway centreline, the spoil should be placed on the side remote from the nearest landing threshold. If it is necessary to place the spoil on both sides of the trench the maximum height should not exceed 200 mm.

At the runway end:

- (a) Any trench across the end of the runway should not exceed 300 mm in width. During daylight hours only, a maximum length of 3 m may be left unfilled during an aircraft movement but should be covered with load-bearing steel plates adequately held on the ground and marked by securely fixed cones at a maximum spacing of 6 m. The plate covering should exceed the dimensions of the excavation by a minimum of 150 mm on all sides. If this cannot be done then the runway should be closed.
- (b) Spoil removed from a threshold trench should be removed to a point at least 10 m clear of the runway or a displaced landing threshold should be declared by NOTAM and marked.

Zone 2. For a Code Number 4 runway which is dry with not more than 15 kt crosswind component, or for other runways with 10 kt crosswind component, the excavation of trenches in this zone should be limited to:

- (a) a trench parallel to the runway may be open with a maximum width of 300 mm and a length not exceeding 100 m; or
- (b) two trenches at right angles to the runway may be open with a maximum width of 300 mm and a total length of 100 m provided that the trenches are at the same end and same side of the runway.
- (c) Spoil removed from a trench should be located on the side away from the runway, its maximum height should not exceed approximately 500 mm.
- (d) For trenches at right angles to the runway centreline, the spoil should be located on the side remote from the closer landing threshold and the maximum height should not exceed approximately 300 mm. If it is necessary to place the spoil on both sides of the trench then the maximum height should not exceed approximately 300 mm.

9. Work on rapid exit or normal taxiways

- 1) Work on or close to any taxiways, should conform to the requirements relating to the zone in which that part of the taxiway lies.
- 2) Where practicable, until work is complete, the taxiway should be closed to aircraft movements and pilots advised by radio and NOTAM.
- 3) If it is not practicable to close the taxiway while work is being carried out, pilots should be advised by NOTAM and radio to reduce taxiing to walking speeds within 50 m of the works.
- 4) The work should be carried out as follows:
 - (a) A trench, with a maximum width of 300 mm, may be open on one side only to the edge of the taxiway, and the open area of the trench should not exceed 9 m², for example, 300 mm x 30 m or 200 mm x 45 m.
 - (b) If trenching is required on both sides of the taxiway, the trench on one side should be covered with load-bearing steel plates which are adequately held on the ground and marked by securely fixed cones at a maximum spacing of 6 m. Where

the trench is at right angles to the taxiway and its width is 300 mm or less, the trenches on both sides of the taxiway can remain open. The plate covering should exceed the dimensions of the excavation by a minimum of 150 mm on all sides.

The following additional conditions apply if there are night operations:

- (a) Any trench should be backfilled and consolidated before ceasing work for the day except that a maximum length of 3 m can be left unfilled and covered overnight and marked with red obstruction lights.
- (b) Any materials not associated directly with the work in progress should be removed from the taxiway strip area during the period of aircraft operations.
- (c) Spoil removed from a trench in Zone 1 should be located on the side away from the runway and the maximum height should not exceed 200 mm. For trenches at right angles to the taxiway centre line, the spoil should be placed on the side furthest away from the nearest landing threshold. If it is necessary to place the spoil on both sides of the trench, the maximum height should not exceed 200 mm.

10. Work on visual approach slope systems

- 1) These requirements when working on visual approach slope systems are additional to those in section 5.
- 2) During some aircraft operations VASIS or PAPI may be deactivated, however:
 - (a) for all international arrivals, the normally available VASIS or PAPI should be provided; and
 - (b) for domestic operations by turbojet aircraft, one side of a VASIS or PAPI or T-VASIS should be provided.

3) The installation of light bases for VASIS and PAPI should be carried out as follows:

Zone 1

- (a) Only one base excavation, with a maximum area of 9 m², should be opened at any one time.
- (b) If the work is within 10 m of the runway edge then the concrete should be cast on the day that the excavation is made, and covered with steel plates until it can withstand an aircraft running over it. A cover plate should then be placed and bolted in position, and further excavation may then be made.
- (c) Spoil within 10 m of the runway edge should be removed. Spoil beyond this distance should be placed on the side away from the runway to a maximum height not exceeding 200 mm.

The following additional conditions apply if there are night operations:

- (d) Any excavation should be backfilled and consolidated before ceasing work for the day except that a maximum excavation area of 3 m² may be left unfilled but covered overnight and marked with red obstruction lights.
- (e) Any materials not associated directly with the work in progress should be removed from the strip area during a period of aeroplane movements.
- (f) Spoil removed from an excavation in Zone 1 should be located on the side away from the runway and the height should not exceed 200 mm. If it is necessary to place spoil on both sides, or at the ends of the excavation, the maximum height should not exceed 200 mm.

Zone 2

- (a) Only one base excavation, with a maximum area of 9 m², should be opened at any one time.
- (b) Spoil removed from the excavation should be placed on the side away from the runway, to a height not exceeding 500 mm. If it is necessary to place spoil on both sides, or at the ends of the excavation, the maximum height should not exceed 300 mm.

11. Work on runway lights

Work on runway lights should be carried out as follows:

- (a) Excavations for not more than two bases should be made at any one time. During aeroplane movements, any holes within 10 m of the runway edge should be covered by load-bearing steel plates which are adequately held on the ground and marked by securely fixed cone markers spaced at intervals of 6 m. The plate covering should exceed the dimensions of the excavations by 150 mm on all sides.
- (b) Concrete should be cast on the day that the excavation is made, and covered with steel plates until it can withstand an aircraft running over it. A cover plate should then be placed and bolted in position. A further excavation may then be made.

12. Grass mowing in runway strip

Mowing should be done in the upwind half of the runway strip. When the strip or area nearest to the runway are being cut, the mowing circuit should be towards the aircraft landing or taking off so that the driver can see the moving aircraft.

Zone 1. Mowing should not take place in zone 1 when the runway is in use.

Zone 2. Mowing may be carried out in daylight hours during the operation of Code A, Code B or Code C aeroplanes, provided that the crosswind component does not exceed 10 kts and the runway is dry.

- 1) The mower should move to the outer edge or clear of the zone for movements by larger aircraft when the crosswind is greater than 10 kts, or the runway is wet.
- 2) Mowing in the area beyond the approach end of the runway should not be permitted during aircraft landings.
- 3) Mowing in the area beyond the take-off end of the runway should not be permitted during aircraft take-offs.