



สำนักงานการบินพลเรือนแห่งประเทศไทย
The Civil Aviation Authority of Thailand

Guidance Material on Protection of Sites for Radar and Navigational Aids

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Approved by

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(Chula Sukmanop)

Director General

The Civil Aviation Authority of Thailand

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Table of Contents

Table of Contents.....	1
0. Introduction	2
0.1 Background.....	2
0.2 Purpose.....	2
0.3 Applicability	2
0.4 Effective Date	2
0.5 Reference	2
0.6 Abbreviations and Definitions	3
Abbreviations.....	3
Definitions.....	3
1. Overview.....	4
1.1 Aerodrome operator’s responsibilities.....	4
1.2 Air navigation service provider’s responsibilities.....	4
2. Work planning and coordination	5
3. Maintenance works affecting radar and navigation aids.....	6
4. Clearance and locations for radar and navigation aids	7
4.1 Radar Sensor Sites	7
4.1.1 Site requirements.....	7
4.1.2 Clearance requirements.....	7
4.2 Other Navigational Facilities	8
4.2.1 Site requirements.....	8
4.2.2 Clearance requirements.....	8
4.2.3 Satellite Ground Stations	8
4.2.4 Satellite Ground Stations	9

0. Introduction

0.1 Background

- A. The Director General (DG) of Civil Aviation Authority of Thailand (CAAT) is responsible for providing regulatory oversight of the persons and entities conducting air operations in Thailand, operating and/or maintaining Thailand registered aircraft, operating and/or maintaining aerodromes and heliports in Thailand, or providing an air navigation service in Thailand. As part of CAAT's regulatory oversight responsibility, the DG may issue, modify, suspend, or revoke certificates, licenses, authorizations, and/or approvals.
- B. The DG may also make decisions and/or take actions to ensure appropriate compliance with the Aerodrome Regulations of Thailand.
- C. This Guidance Material (GM) is published by CAAT. The GM is a means of circulating essential information of an administrative or technical nature to holders of CAAT License and Certificate.

0.2 Purpose

The purpose of this Guidance Material is to provide supplementary guidance to aerodrome operators on the procedures to ensure that there will be no physical or electronic interference with the functionality of radar and navigational aids located within and outside the aerodromes that may be caused by the erection of structures, vehicles, plants, aerodrome works or any other activities in the vicinity of navigational aids. It provides guidance on what is acceptable to CAAT to demonstrate compliance with Aerodrome Regulations.

0.3 Applicability

This Guidance Material applies to all person or entities operating and/or maintaining aerodromes and/or heliports in Thailand.

0.4 Effective Date

31 August 2020

0.5 Reference

Regulation of the Civil Aviation Authority of Thailand No. 14 - Aerodrome Standards
Regulation of the Civil Aviation Authority of Thailand on Aerodrome Manual Standards
Regulation of the Civil Aviation Authority of Thailand on Aerodrome Operations Standards

0.6 Abbreviations and Definitions

Abbreviations

ANSP	Air Navigation Service Provider
DG	Director General
DME	Distance Measuring Equipment
CAAT	The Civil Aviation Authority of Thailand
NDB	Non-Directional Beacon
NOTAM	Notice to Airmen
VMC	Visual Meteorological Conditions
VOR	Very High Frequency (VHF) Omni-Directional Range

Definitions

Director General	The Director General of The Civil Aviation Authority of Thailand or a person assigned by the Director General of The Civil Aviation Authority of Thailand.
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1. Overview

1.1 Aerodrome operator's responsibilities

The aerodrome operator has overall responsibility for establishing procedures to ensure that activities or works under his direct or indirect control do not have an adverse impact on the safe operation of radar and navigational aids. Particulars of the procedures for the protection of sites for radar and radio navigational aids located on or outside the aerodrome to ensure that their performance will not be degraded shall include the following:

- a) arrangements for the control of activities in the vicinity of radar and navigational aids installations;
- b) arrangements for ground maintenance in the vicinity of these installations: and
- c) arrangements for the supply and installation of signs warning hazardous microwave radiation.

In writing the procedures for each category, clear and precise information should be included on:

- when, or in what circumstances, an operating procedure is to be activated;
- how an operating procedure is to be activated and any actions to be taken;
- the persons who are to carry out the actions; and
- the equipment necessary for carrying out the actions, and access to such equipment.

In case of aerodrome works that may affect navigational aids, the Work Manager at the aerodrome, or any other staff member controlling any construction works at the aerodrome, is responsible for advising ANSP of any works proposals that may affect the operation of radar or navigational aids at the aerodrome, including any cables associated with the facilities.

The aerodrome is responsible for the physical protection of its radar and navigational aids that may be used by aircraft intending to land at the aerodrome. The navigational aid may be located at the aerodrome or not. This may be including appropriate fencing and warning signs to restrict entry to each site.

1.2 Air navigation service provider's responsibilities

ANSP is responsible for all site maintenance of off-airport radar and navigational aids.

2. Work planning and coordination

The aerodrome operator's nominees with responsibility for airport works are required to give prior notification to ANSP of:

- Work activities in the vicinity of radar and navigational aids which might affect the signals to and from those facilities; and
- Proposed excavation work within 3m of cables associated with the facilities.

This advice shall be provided formally during the planning stage of a Method of Works Plan (MOWP) or Permit to Commence Work (PERCOW). The aerodrome operator's designated person will prepare a PERCOW (or a MOWP) for any activity that may affect aircraft operations by causing interference with a radar or navigation aid, or its signal to aircraft. Planning for such work shall include input from ANSP. ANSP shall establish any restrictions necessary. A copy of any MOWP or PERCOW issued for such works shall be forwarded to ANSP for advice and CAAT for permission.

The Works Manager and Works Supervisor shall ensure that all persons involved in works at the aerodrome understand and comply with the restrictions imposed to protect the radar, navigational aids, and their associated cabling system. This applies to workmen, sub-contractors, and any other organization carrying out works at the aerodrome. Where there is a possibility of interference to the radar or navigation aid signal due to transient obstacles, such as vehicles traveling on perimeter roads, signs displaying the appropriate warning or instruction shall be erected.

Vehicles and plant shall not enter the navigation aid restricted areas of the airside or any other adjacent locations without prior ANSP approval. Vehicles crossing near the navigation aids will maintain 30 km per hour to avoid signal interference.

3. Maintenance works affecting radar and navigation aids

All ANSP personnel or contractors are required to abide by the security arrangements for gaining access into the airside.

The Aerodrome operator's designated person will contact ANSP where mowing works may affect navigation aid signals. The Maintenance Supervisor, who represents the Works Manager, will contact ANSP at least 24 hours prior to the works to ensure that navigational aids can be turned off when required e.g. not in Instrument Meteorological Conditions (IMC) or no flight testing will be in progress.

ANSP shall be notified for works affecting the DME/VOR at least 24 hours prior to works commencement. This will allow ANSP time to issue a NOTAM and to arrange for qualified personnel to be in attendance to deactivate or activate the facilities if or as required. Localizer navigational aids at the runway ends and other ILS navigational aids which may not have remote ANSP control shall require physical switching. Temporary decommissioning of a navigational aid for aerodrome works shall only be permitted in VMC (1500ft ceiling and 5km visibility)

As a guide in preparing for minor maintenance activity, work within the following areas can be expected to cause interference with the relevant navigation aids:

- Localizer – from 360m in front to 10m behind the localizer aerial, and 90m either side of the runway centreline;
- Glide path – from glide path building, an area extending 700m directly in front of the building towards the landing aircraft, at a width of 175m towards the associated runway centreline; and
- VOR – within a radius of 150m of the VOR

Any other major works or works involving a large amount of equipment, or tall equipment, should be referred to ANSP for advice on the effect on navigational aids.

4. Clearance and locations for radar and navigation aids

Clearances for radar and navigational aids facilities associated with the aerodrome shall be shown in the drawing plan to ensure that locating of the relevant radar and navigation aids is identified to enable their protection within and outside aerodromes.

4.1 Radar sensor sites

4.1.1 Site requirements.

The site requirement for existing types of radar sensors is a rectangular area about 50m by 40m, including sufficient space for a crane to manoeuvres and an antenna maintenance pad. For new sites, the above dimensions may be reduced, depending on whether or not standby power generation are co-located, however the antenna maintenance space in which a crane manoeuvre may be the limiting factor.

4.1.2 Clearance requirements.

Radar transmission clearance requirement are intended to prevent the following:

- (a) Holes in the coverage by new constructions blocking line of sight between radar and aircraft. Any construction, which geometrically intrudes above the existing skyline as seen by the radar, will have an effect.
- (b) Interference with near fields of the antenna, which may disturb the antenna pattern in the far field. This applies within 500m of most radars.
- (c) Diffraction and bending of signals by edges and thin objects which can cause incorrect radar determined location, loss or confusion of radar tracks etc. Likely hazards in this regard are poles such as lighting poles.
- (d) Reflections of the radar signals from fixed or mobile surfaces. Reflections cause aircraft to appear on radar screens in more than one location.

The following clearance requirements are to be maintained:

- (a) No intrusion within 1km of the radar into a height surface 5m below the bottom of the antenna. No intrusion between the radar and the possible location of any desired targets, i.e. roughly speaking above 0.5 degrees elevation at any distance.

- (b) No metallic or other electrical reflective surfaces anywhere which subtend an angle of more than 0.5 degrees when viewed from the radar, e.g. Fences, power lines, tanks as well as many buildings. All overhead power lines within 1 km must be aligned radically to the radar or be located at least 10 degree below horizontal from the antenna.
- (c) No radio interference emitters within 2km having any component of transmission in the radar bands, e.g. Welders and electrical transmission lines. No electrical transmission lines within following specified distances:
 - I. 2kV – 22kV 400m
 - II. 22kV – 110kV 1km
 - III. above 110kV 2km
- (d) Other electronic equipment may be affected by the radar transmissions. Such equipment should not be located where the radars may interfere with their performance. People are therefore to be cautioned against approaching any location within a 500m radius of a primary radar antenna and which is between 5m below and 50m above the horizontal level of the bottom of the antenna.

4.2 Other navigational facilities

4.2.1 Site requirements.

The physical site requirements will vary significantly depending on the type of communications facility, and it is therefore not possible to specify a general requirement and hence it shall be on specific basis (other than for Satellite ground station sites).

4.2.2 Clearance requirements.

Reliable VHF/UHF communications require a clear line-of-sight path between the base station and aircraft and vehicles using the facilities. The construction of buildings, towers, etc., may prevent reliable communications hence shall not be allowed within a safe distance specified by the equipment manufacturer.

4.2.3 Satellite Ground Stations

The site requirement is a square area of dimension 25m by 25m.

4.2.4 Precautions against Exposure of Personnel to Radio Frequency Radiation from Radar Systems

The primary surveillance radar transmitters on airports radiate high power beams of radio frequency energy. In close proximity to a surveillance radar antenna, the electromagnetic field strengths within the transmitted radar beam may be such that persons could be subjected to radiation exposure levels in excess of the safe limits. Airport staff is therefore to be cautioned against approaching any location within a 500m radius of a primary radar antenna and which is between 5m below and 50m above the horizontal level of the bottom of the antenna.