Second meeting of the Aerodrome and Ground Aids Implementation Working Group (AGA) of the North American, Central American and Caribbean Working Group (NACC/WG) (NACC/WG/AGA/TF/2)

Obstacles at Aerodromes Evaluation and Mitigation for Operations

Raúl A. Martínez Díaz
Aeronautical Information Management (AIM) Regional Officer, NACC Office

Introduction

- What is an obstacle for ICAO?:

"…any fixed (whether temporary or permanent) or mobile object, or parts thereof, which is situated within an area intended for the movement of aircraft on the surface or which protrudes from a defined surface, intended to evaluate and protect "aircraft in flight"

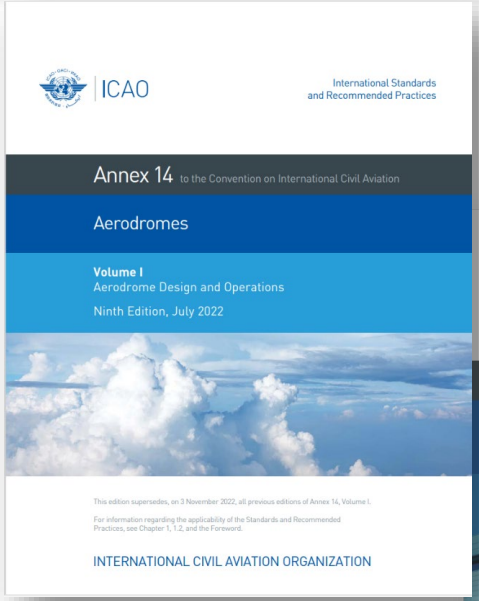
- Recommendation 6/14 of the 12th. Air Navigation Conference and ICAO 38th Assembly (WP/143):

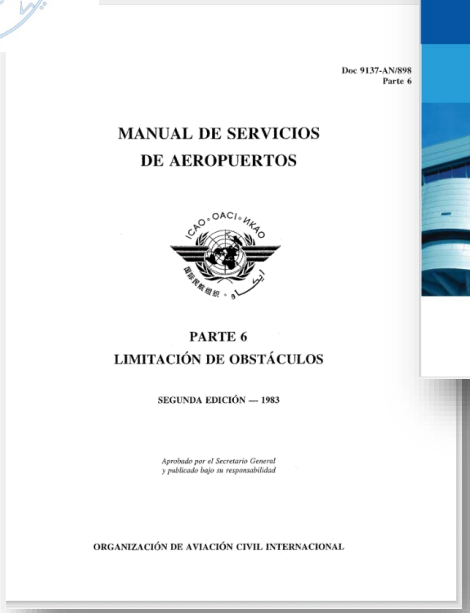
…calls to review obstacle limiting surfaces and develop guidance material to conduct aeronautical studies to evaluate allowable penetrations to these surfaces

Introduction …cont

- The airspace around airports is a valuable asset
- Community pressure for development
- Developers have the (economic) means to prepare Aeronautical Studies (*) that challenge the current limitations of Surface Limiting Obstacles (SLOs), especially when there is no connection between the SLOs and current operations

ICAO Documentation





ICAO Documents

- Annex 14, Vol. I
- Annex 4
- Annex 15
- PANS –AIM (Doc 10066)
- PANS – OPS (Doc 8168)
- PANS-Aerodromes (Doc 9981)
- Airport Services Manual, Part 6 (Doc 9137)
- TOD - Terrain and Obstacle Data Manual (Doc. 9881)
- Manual of the World Geodetic System – 1984 (WGS-84, Doc. 9674)

Revisión de las OLS

Review of existing OLS

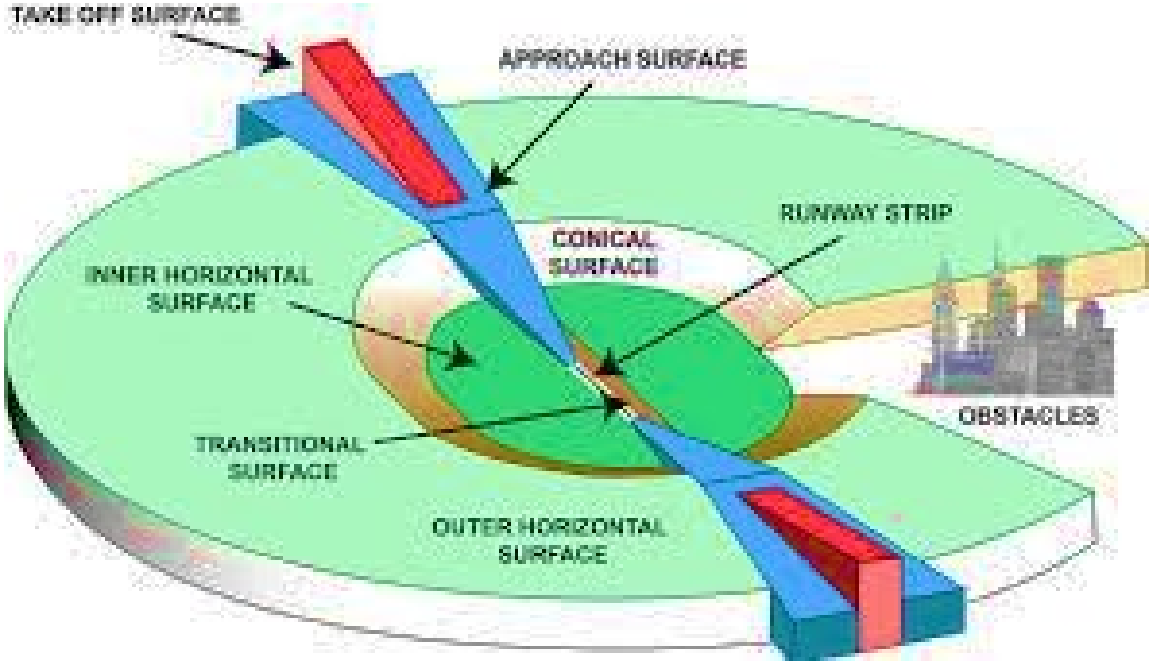
- Inconsistency between OLS and modern aircraft performance;
- Incompatibility between Annex 14, Annex 6 and the PANS OPS;
- OLS are not updated to protect new air operations and procedures;
- Increased competition between safety and economic considerations on and around the airfield.

Development of guidance on the Aeronautical Study

- Lack of ICAO guidelines for conducting aeronautical studies

Principles of the new concept of OLS

- Protection of airspace for planned air operations;
- Ensure the suitability and proportionality of the dimensions of the surfaces to the operations planned at the aerodrome;
- Provide States with some flexibility to extend requirements; and
- Use “PANS Aerodromes” as a tool to ensure a globally harmonized application



Reference and requirements of Annex 15 of the Terrain and Obstacle Data TOD (**) Doc. 9881, in Aerodromes

In accordance with ANC Task No. AIS-9802, amendments to Annex 4 were initially planned. However, one State, in their reply to a State letter soliciting comments concerning the proposed inclusion of electronic terrain data specifications in Annex 4, suggested that since “specifications relating to the provision of obstacles, cultural and vegetation data are already contained in Annex 15, the proposed material seemed more appropriately placed into Annex 15, particularly when considering that Annex 15, Appendix 7 already deals with “aeronautical data quality requirements”. It was also suggested that the proposed electronic terrain data quality requirements could easily be incorporated into Appendix 7 of Annex 15 — Aeronautical Information Services, while Annex 4 should continue to deal only with charting specifications, which are quite separate issues.

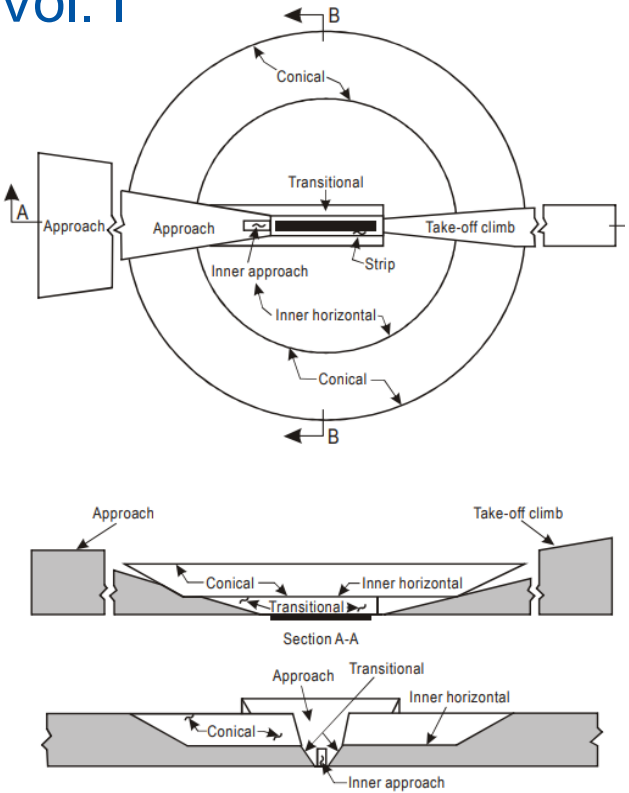
WGS84 PACs and SACs data in AD

- Annex 15 introduces provisions relating to the promulgation of Lat/Long Geographic Coordinates in the WGS84 Datum, and the publication of the vertical Geoidal Undulation component of the WGS-84 geodetic reference system (Doc. 9674).
- Amendments to Annexes 4 and 14, Volumes I and II, PANS OPS
- The SARPs of Annexes 11 and 14, Volumes I and II, govern the determination (accuracy of field work – topographic surveys) and publication of geographical coordinates in the WGS84 geodetic system
- Los Anexos 4 y 15 de los SARPS regulan la publicación en forma textual o gráfica de las coordenadas geográficas (resolución) y verticales

WGS84 Lat/Long Coordinates Data Network of Primary and Secondary Control Points (PACs and SACs) in AD

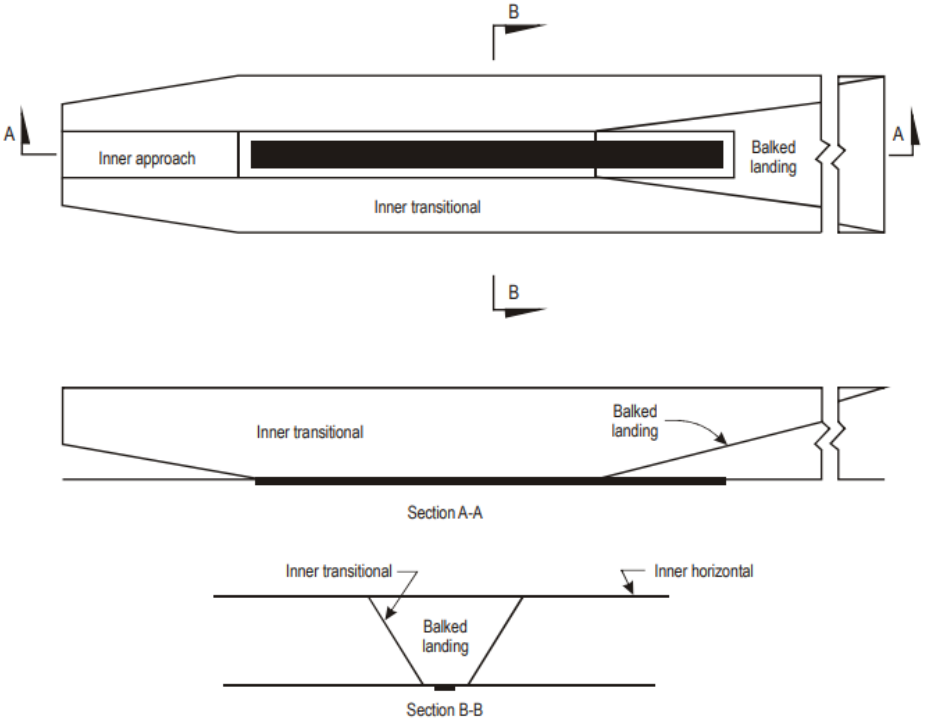
Chapter 4 Annex-14 Vol. I

Note 1.— The purpose of the specifications in this chapter is to define the airspace that must be kept free of obstacles around aerodromes so that planned aircraft operations can be carried out safely and to prevent aerodromes from becoming unusable due to overcrowding. of obstacles in its surroundings. This is achieved through a series of obstacle limiting surfaces that mark the limits to how far objects can project into the airspace.



Chapter 4 Annex-14 Vol. I

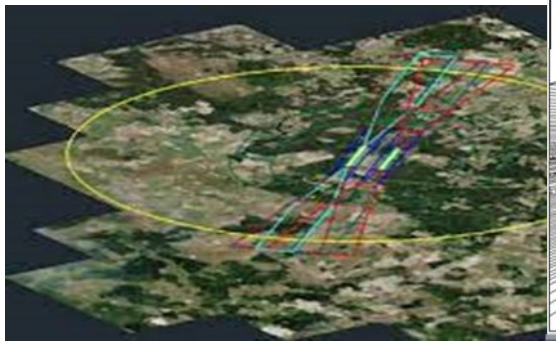
Note 2.— Objects passing through the obstacle limitation surfaces specified in this chapter may, in certain circumstances, result in an increased obstacle clearance altitude or height in the instrument approach procedure or in the corresponding approach procedure, visual circuit or exert other operational impact on the design of flight procedures. Flight procedure design criteria are indicated in the Procedures for Air Navigation Services — Aircraft Operation (PANS-OPS), (Doc 8168 Vol. II).

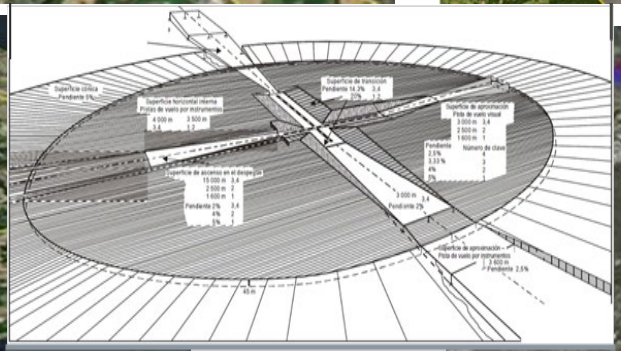


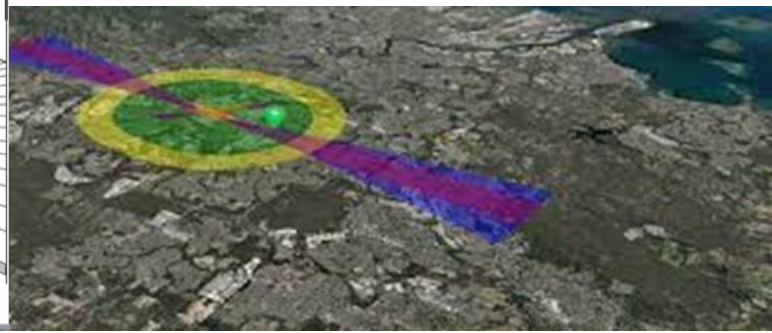
Identification and Analysis of Obstacles within an Area in the surroundings of an Aerodrome

A Scan is made on the Map within the Area in question and the Elevations are located and assigned a numerical sequence to enter a matrix in the Database and thus process their possible impact on the applicable slopes or surfaces.


Airports
Content goes here
Show approach
Show takeoff
Show innerHorizontal
Show conical
Show transitional

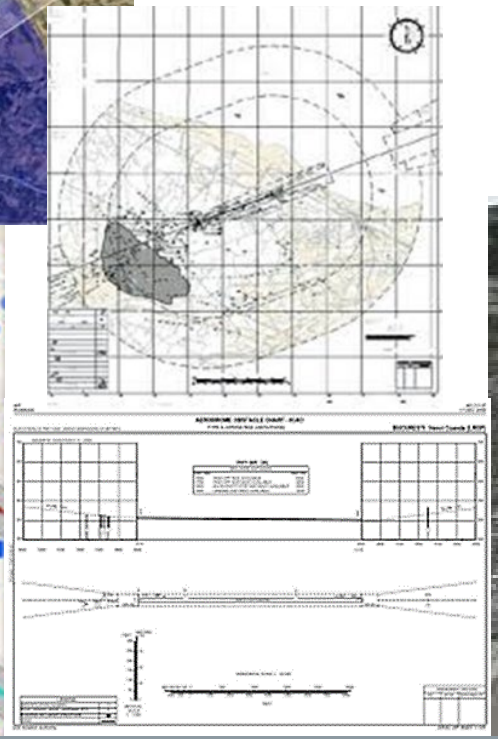


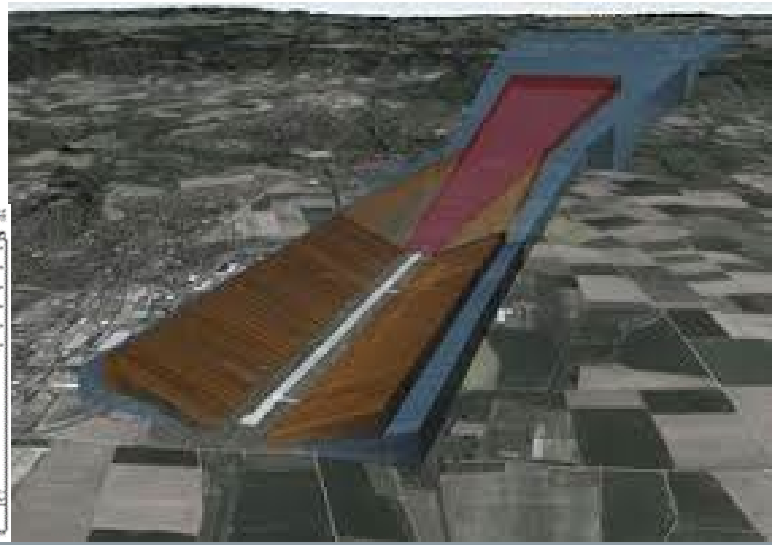





OBSTACLE ANALYZE


10L/28R





Uses in the States

- Obstacle cards (Annex 4)
- Design of IFR procedures Including PBN (PANS OPS)
- Analysis of SLOs at aerodromes (Annex 14)

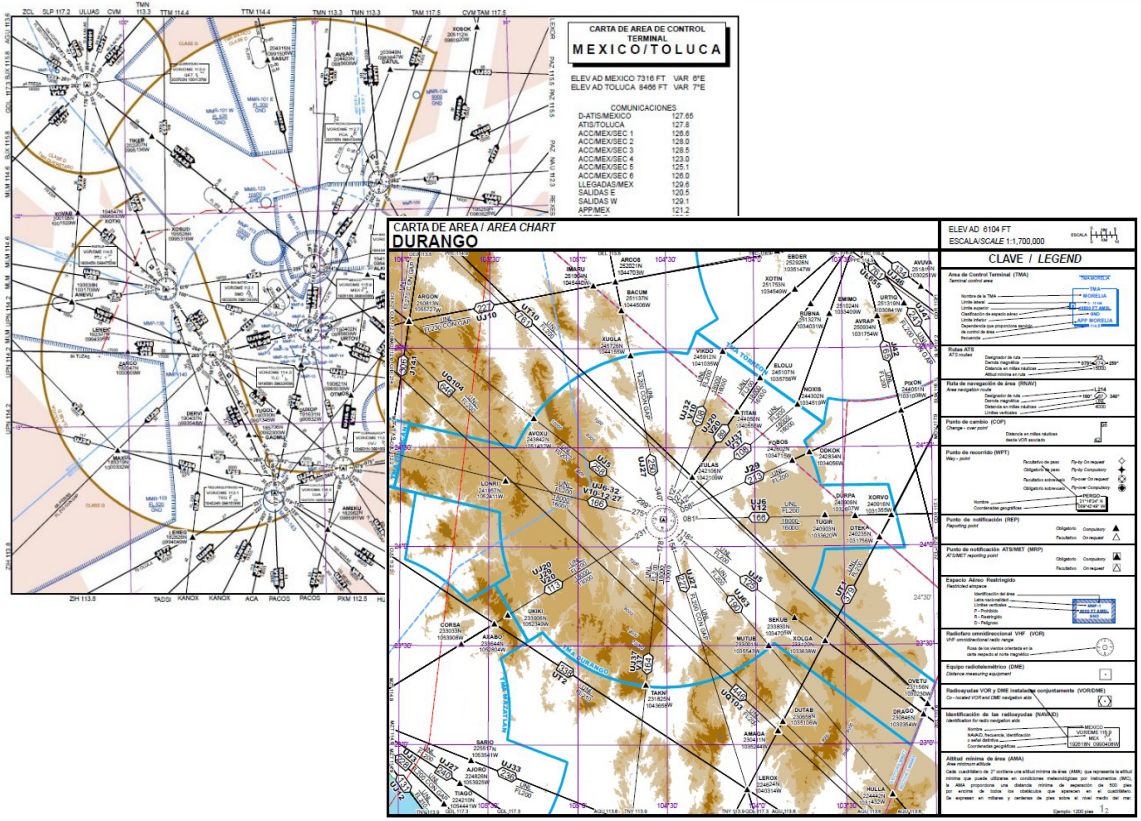
Uses in the Aeronautical Community and Industry

Growing need to use validated terrain and obstacle data (TOD) for civil and military (mil) applications:

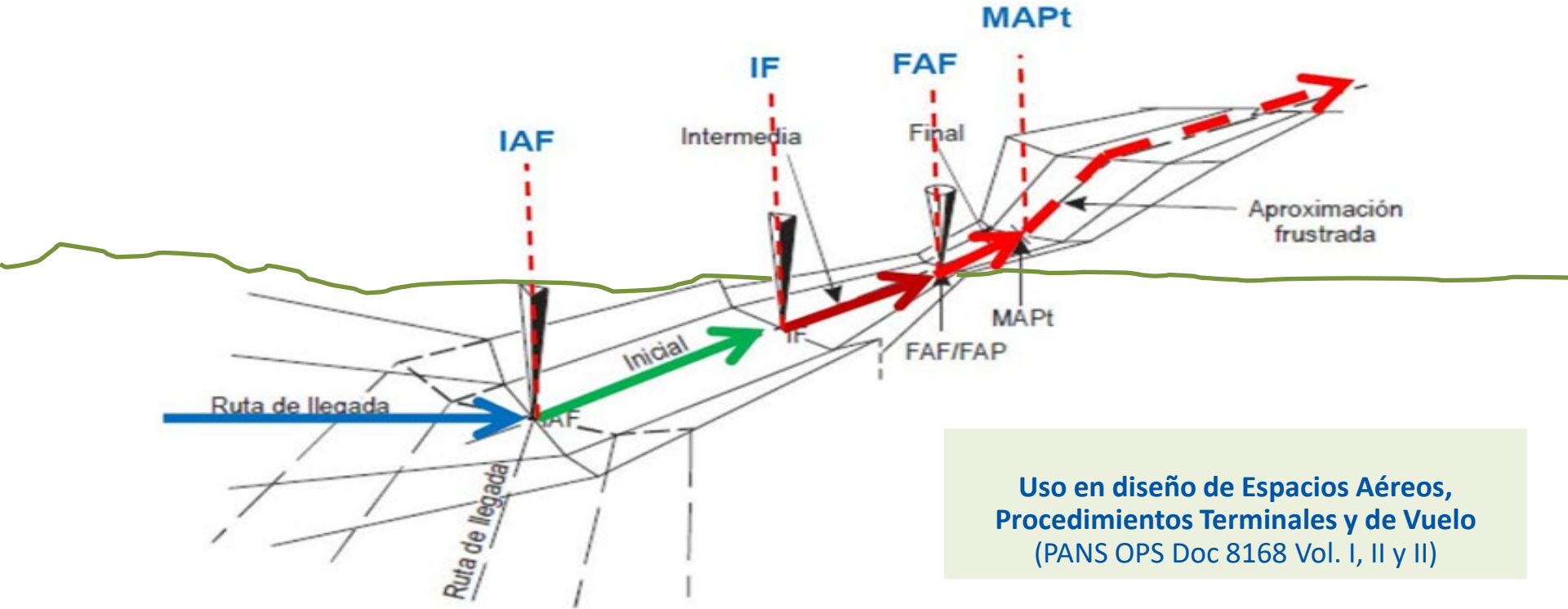
- Terrain awareness systems (EGPWS/TAWS)
- Synthetic vision systems in the cabin
- Advanced Surface Guidance and Control System (A-SMGCS)
- Obstacle control
- Etc. (.mil)

Use in Airspace Design, Terminal and Flight Procedures (PANS OPS Doc 8168 Vol. I, II and II)

- PANS-OPS surfaces are used by procedure designers for the design of instrument flight procedures (IFP).
- Avoid collisions with obstacles for instrument flights
- The designer prepares the Areas and surfaces for the IFP sections (IAF, IF and FAF)
- Analyzes the obstacles in the Areas and specifies the altitudes with a margin over obstacles and determines the minimum safety altitudes for each section of the procedure, which the pilots will use.

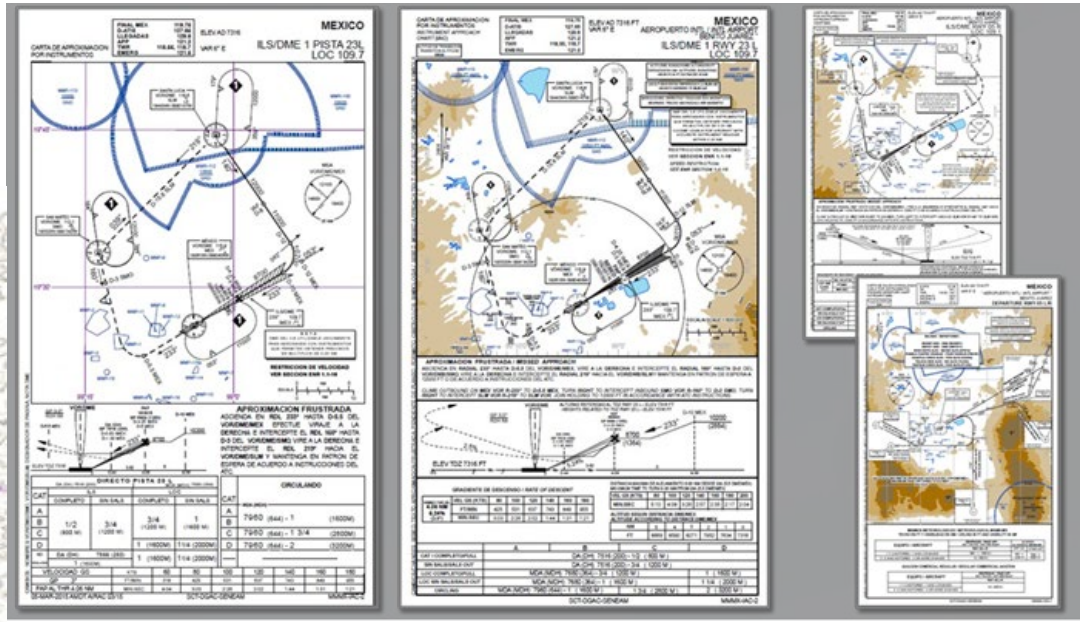


Example of PANS OPS Surfaces



Uso en diseño de Espacios Aéreos, Procedimientos Terminales y de Vuelo
(PANS OPS Doc 8168 Vol. I, II y II)

Use in airspace design, terminal and flight procedures



(PANS OPS Doc 8168 Vol. I, II y II, Annex 4)

External horizontal surface

Note. Guidance on the need to provide an external horizontal surface and its characteristics is contained in the **Airport Services Manual** (Doc. 9137, Part 6).

CHAPTER 4. Restriction and removal of obstacles:

- 4.1 Obstacle limiting surfaces
- 4.2 Obstacle limitation requirements
- 4.3 Objects outside obstacle limiting surfaces
- 4.4 Other objects

Aeronautical Studies - AS (*)

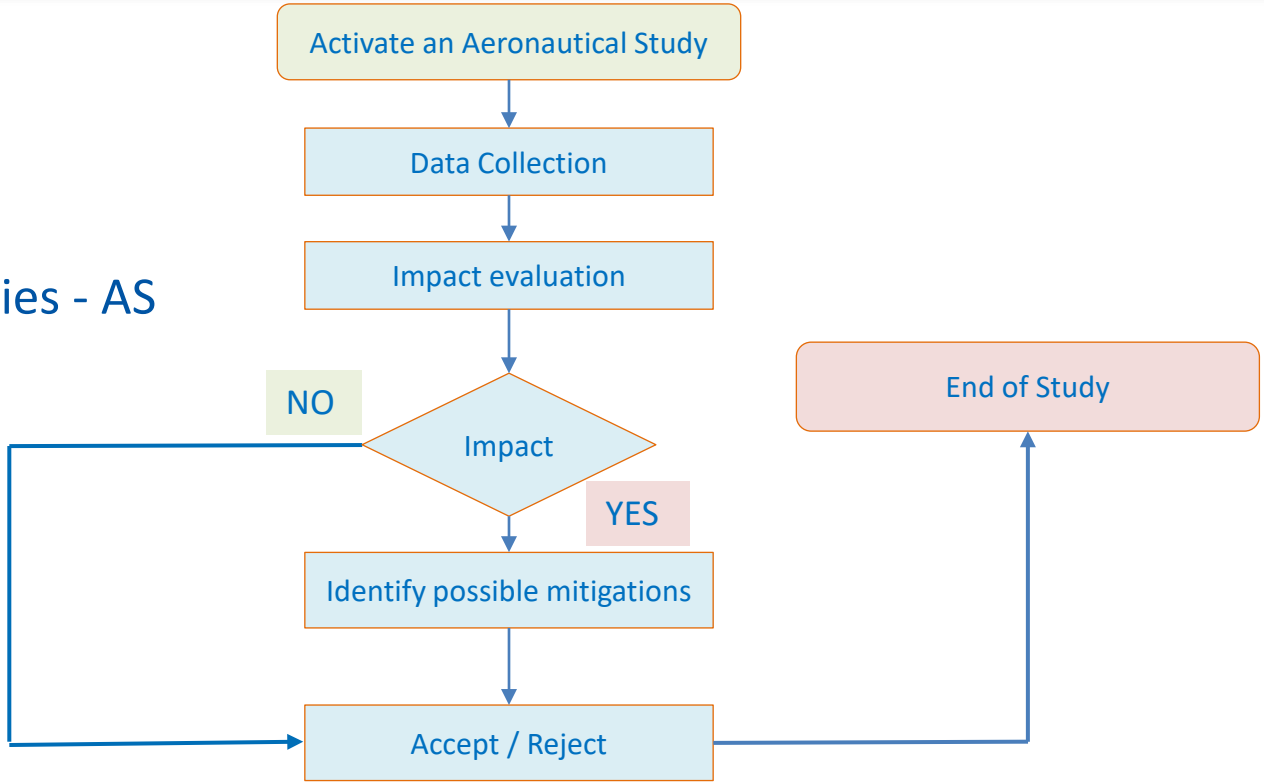
Possible mitigation measure

Aeronautical Studies – AS

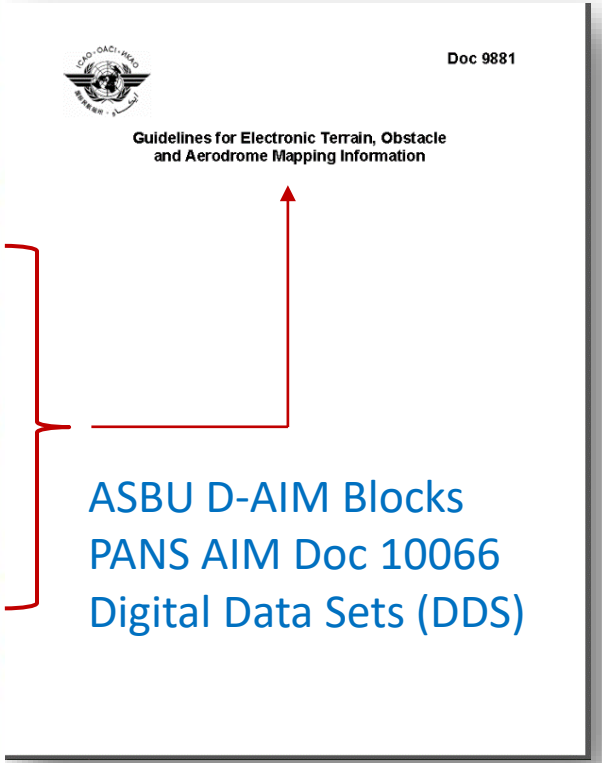
- There is an absence of guidelines for the evaluation of AS, it is difficult to identify the effect of obstacles on operational safety
- There are different applications of ASs in the world. There is a proliferation of aeronautical studies, or a lack thereof.
- ASs can be long, expensive and not objective in the evaluation

- The AS in the PANS-AD will focus on the impact on flight operations detailing hazards, potential mitigations, and the impact of mitigation adoption.
- The AS guidelines will also specify that, apart from “air operations”, other aeronautical issues such as AIM, CNS, ATM, MET, etc. They will be considered as part of the AS process.
- This will form the subset of the AS and will be taken into account in the process of accepting a violation

Aeronautical Studies - AS

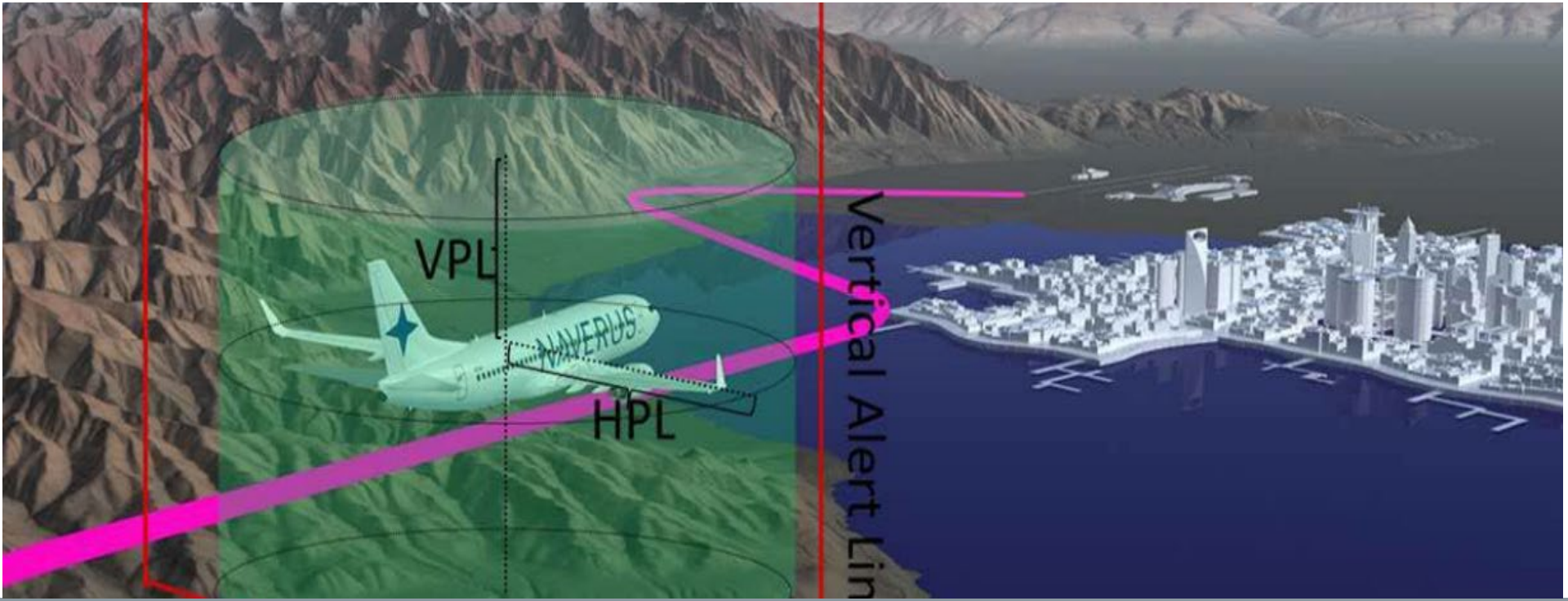


DAIM-B1/1	Provision of quality-assured aeronautical data and information	Information
DAIM-B1/2	Provision of digital Aeronautical Information Publication (AIP) data sets	Information
DAIM-B1/3	Provision of digital terrain data sets	Information
DAIM-B1/4	Provision of digital obstacle data sets	Information
DAIM-B1/5	Provision of digital aerodrome mapping data sets	Information
DAIM-B1/6	Provision of digital instrument flight procedure data sets	Information
DAIM-B1/7	NOTAM improvements	Information



ASBU D-AIM Blocks
PANS AIM Doc 10066
Digital Data Sets (DDS)

Terrain and Obstacle Data TOD (**) Doc. 9881



TOD Terrain and Obstacle Data (**)

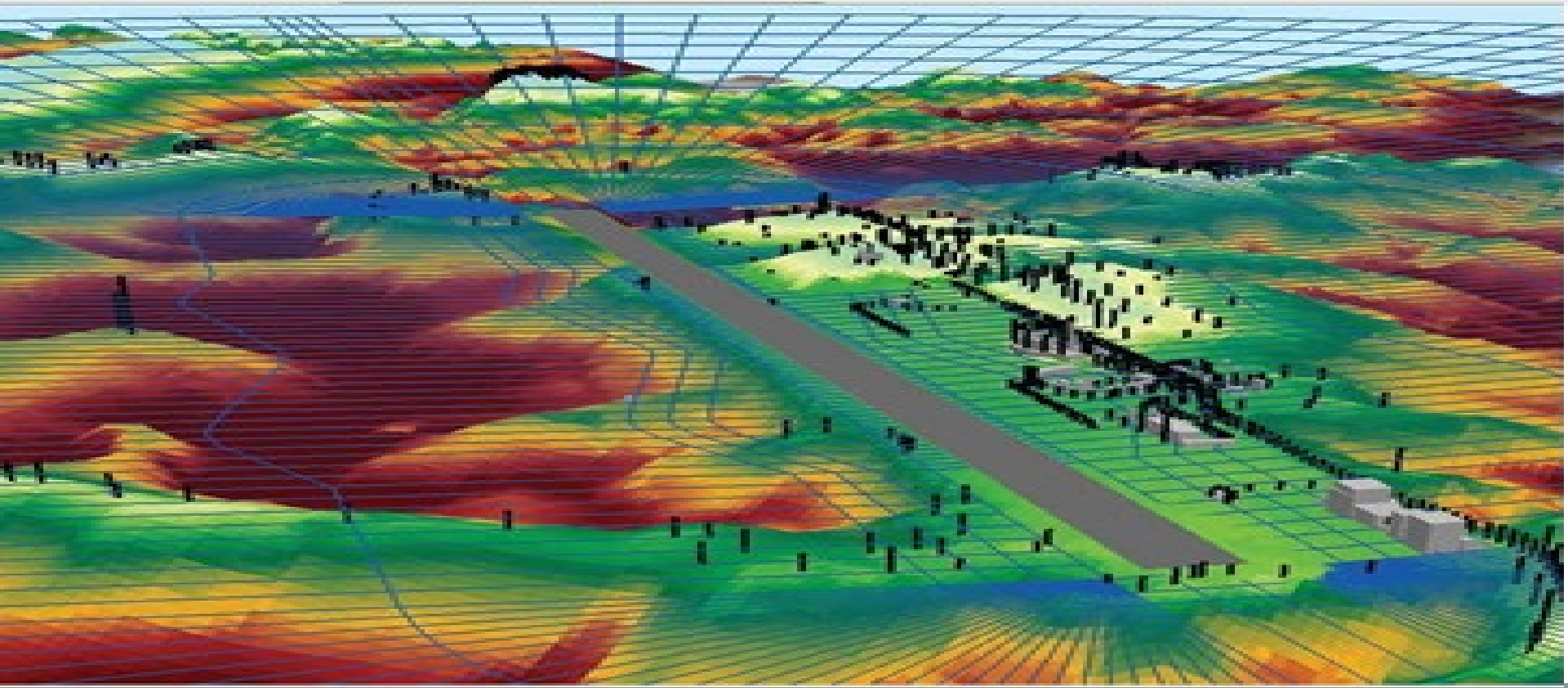
a. **METADATA**
b. ICAO Terrain and Obstacle Data Requirements Doc. 9881
c. WGS84 Coordinate Data Network of Primary and Secondary Control Points in AD (PACs and SACs)
d. TOD Coverage Areas 1, 2, 3 and 4
e. TOD Numerical Requirements
f. TOD (civil-military) applications
g. Considerations for Digital Data Sets (DDS-PANS AIM Doc. 10066)
h. Terrain and Obstacle Data (TOD) Implementation Plan
i. Development of a National TOD Policy

TOD Terrain and Obstacle Data Developments by AIM TF CAR

Nr.	Task
1	Overview of digital aeronautical data sets
2	Provision of terrain and obstacle data sets
3	Provision of Aerodrome Mapping Datasets (AMD)
4	Provision of Aeronautical Information Publication (AIP) Data Sets
5	Provision of instrument flight procedure data sets
6	Implementation of database-driven graphs in the CAR Region
7	Coordinated deployment of digital data sets in the CAR Region

TOD Terrain and Obstacle Data Implementation Actions

- Identification of Responsible Body
- Identification of Stakeholders
- TOD Awareness Day
- State Working Group
- Focal Points and Functions
- State Policy with Regard to TOD
- Assessment of Regulation
- State Policy on Aerodrome Safeguarding
- Obstacle Permission Process
- Data Sources and Originators
- Data Acquisition
- Cross-border Provision of Data
- Data Validation and Verification
- Data Maintenance
- Obstacle Identification
- Data Provision
- Monitoring/Audit of Implementation
- Cost Recovery and Charging



ICAO

THANK YOU