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APAC ALG TRANSPORTATION INFRASTRUCTURE & LOGISTICS ČVUT ČESKÉ VYSOKÉ UČENÍ TECHNICKÉ V PRAZE

General Feasibility Assessment

CZCAA IFR Study

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1 Introduction

This general feasibility assessment provides an initial overview of the IFR procedures CONOPS implementation project and will serve as the basis for the upcoming phases of the project. This assessment focuses on the current situation of a group of Czech airports suitable for the analysis of the project.

Even though the aim of the project is to enable the implementation of IFR procedures in uncontrolled airports, in the Czech Republic there are international airports with this kind of procedures, such as Prague-Václav Havel (largest airport in Czech Republic with 12 million passengers), Brno Airport (second Czech airport, located in the southeast of the country, counts with more than 450.000 passengers) and Ostrava Airport (around 300.000 passengers and located in the east part of the country). Apart from these, there are two other international airports with scheduled flights: Karlovy Vary Airport (around 100.000 passengers) and Pardubice Airport (around 60.000 passengers).

However, there are many other aerodromes or airports throughout the country which are not entitled for IFR operations. Most of them are mainly used by General Aviation or by flying academies. The present study aims at determining the feasibility of implementing IFR procedures in a selection of three uncontrolled Czech Airports:

- Mnichovo Hradiště – LKMH
- Hradec Králové - LKHK
- České Budějovice - LKCS

In order to properly assess the feasibility of implementing these procedures on these abovementioned airports, a comparative analysis with a selection of similar European airports that have already implemented these IFR procedures has been performed.

Apart from the facilities and operations, an identification and analysis of the project regulative basis and specific IFR regulative requirements resulting from EU legislation have been performed as part of this feasibility assessment in order to evaluate the constraints (at European or at State level) that the regulations may impose on the implementation of these procedures at these uncontrolled airports. The feasibility assessment will conclude whether it is possible with current infrastructure and regulatory framework to implement the procedures or modifications should be carried out. In case modifications are required, depending on the type of modifications assessed at this stage the project will be considered feasible or not. For example, in case modifications to current European regulatory framework are required, the project should be considered unfeasible, since these kind of modifications are out of scope of the project.

2 Feasibility Assessment tasks

The methodology followed for the development of this General Feasibility Assessment includes four main tasks as depicted in the figure below:

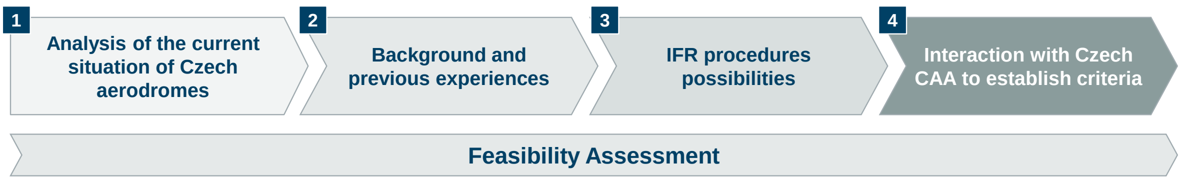


Figure 1 Feasibility Assessment tasks

- **Analysis of the current situation of Czech aerodromes**

This initial task develops a detailed analysis of the three selected uncontrolled aerodromes in the Czech Republic. This task will set the basis of the project and will be key to establish the project scope. Specifically, this task will include a review of the current facilities and operations of these applicable uncontrolled aerodromes. Furthermore, an analysis of the Czech airspace organisation and the potential implications that this project may imply in this regard has been included as part of this task.

- **Background and previous experiences**

The core activity of this task included the performance of an in-depth review of similar European airport cases. This review consists of an overview of the facilities and operations of seven (7) European airports from various countries: Germany, Norway, United Kingdom, Hungary, Portugal and Spain; that have already implemented IFR procedures despite being uncontrolled airports. The airport selection has been made taking into consideration the degree of similarity to the three Czech uncontrolled airports and trying to cover different European countries. This way, the comparative analysis between the Czech airports and the rest of European airports would be much more useful and comprehensive. A special case studied for this task is Teruel Airport in Spain, where a specific project was established in 2016 to implement IFR procedures. A special focus has been set on projects as Teruel, in which the initial feasibility seemed unreal.

Regarding the effects on the local airspace organisation, the case of Germany has been studied in detail, as their airspace organisation enablers for IFR operations in uncontrolled aerodromes could serve as guidelines for the Czech case.

- **IFR procedures possibilities**

This task addresses the general requirements derived from each of the various RNP APCH approach procedures, describing both non-precision 2D approaches (LNAV and LP) and APV 3D approaches (LNAV/VNAV and LPV). Some of these procedures require only GPS, so little adjustments may be needed for the airspace users, while other procedures could imply the use of SBAS, EGNOS or GALILEO. The conclusions of the global feasibility assessment after interactions with the CZCAA and affected stakeholders will determine which type of RNP APCH procedure is most suitable for each of the three studied Czech uncontrolled airports.

- **Interaction with CAA to establish criteria**

This task aims at determining which uncontrolled airports are suitable for which IFR procedure and the high-level consequences that these implementation may entail. After this final step, project feasibility in terms of safety, operational, legal or financial issues has been defined. For the upcoming stages of the project, it will be essential to capture business strategic requirements based on a clear and smooth communication with the CZCAA in order to assess the business feasibility of the applicable IFR procedures. Hence, a first initial contact has been made with the CZCAA during the kick-off meeting in order to capture the main requirements and afterwards, once the feasibility study in terms of operations and infrastructure has been conducted and presented to the CZCAA, their feedback will be incorporated into the document.

It is essential to bear in mind that this General Feasibility Assessment will serve as a precondition for the further processing of CONOPS Implementation of IFR procedures.

2.1 Analysis of the current situation of Czech aerodromes

This section comprises the two different parts of the analysis. The first one is the description of the current airspace organisation in the Czech Republic, with a special focus on the airspace surrounding uncontrolled aerodrome, such as ATZ, RMZ or TMZ. The second part encompasses the in-depth review of the three selected uncontrolled Czech airports: Mnichovo Hradiště, Hradec Králové and České Budějovice. This review includes an analysis of their current facilities and operations.

2.1.1 Czech airspace classification

According to the AIP CR, the Czech airspace is structured and classified following the ICAO airspace directives, the classification of uncontrolled airspace is declared as airspace G, whilst the classification of controlled airspace is designated as C, D or E. Nevertheless, airspace F is currently not used in the Czech Republic. Airspaces A and B are not declared nor used in the Czech Republic.

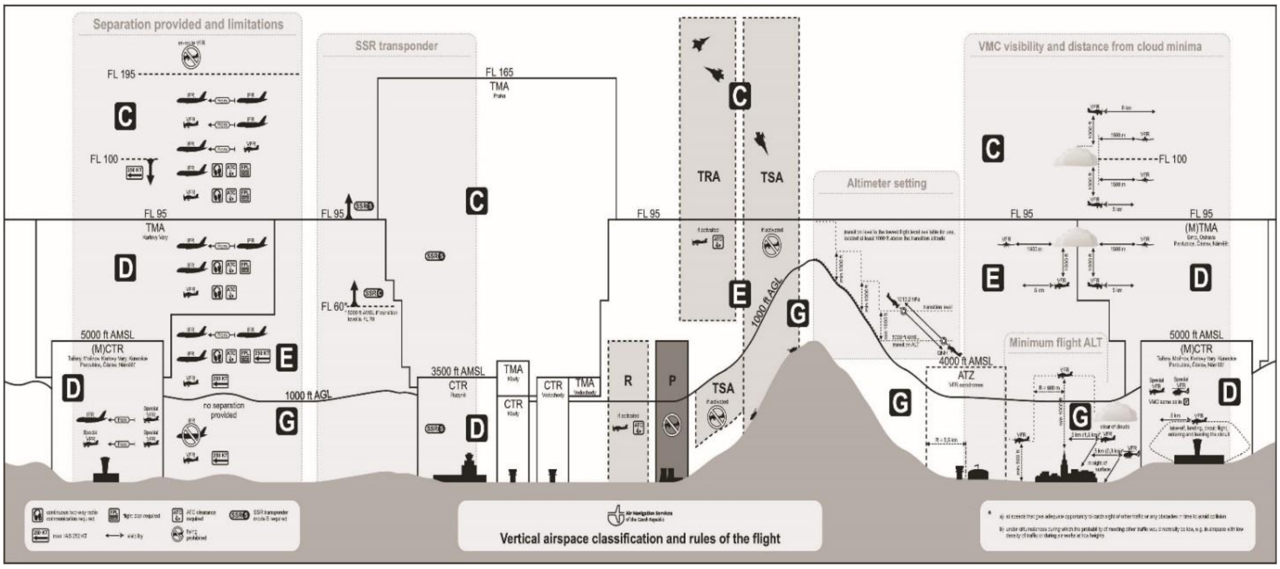


Figure 2 Overview of airspace classification

Czech republic airspace also contemplates special airspace zones such:

- **Aerodrome Traffic Zones (ATZ)**, aircraft within an ATZ must obey the instructions of the tower controller (if present), or must make radio contact with the Aerodrome Flight Information Service unit or Air/Ground Communication Service unit for the aerodrome before entering the zone (in the case of an uncontrolled airfield), or must obey ground signals if non-radio. In the Czech Republic, ATZs are currently only used for uncontrolled aerodromes.
- **Radio Mandatory Zones (RMZ)[1]**, airspace wherein the carriage and operation of radio equipment is mandatory.
    - VFR flights operating in parts of Classes E, F or G airspace and IFR flights operating in parts of Classes F or G airspace designated as a radio mandatory zone (RMZ) by the competent authority shall maintain continuous air-ground voice communication watch and establish two-way communication, as necessary, on the appropriate communication channel, unless in compliance with alternative provisions prescribed for that particular airspace by the competent authority.
    - Before entering a radio mandatory zone, an initial call containing the designation of the station being called, call sign, type of aircraft, position, level, the intentions of the flight and other information as prescribed by the competent authority, shall be made by pilots on the appropriate communication channel.
- **Transponder mandatory zone (TMZ)**, airspace wherein the carriage and operation of transponder equipment is mandatory.
    - Aircraft must be equipped by SSR transponders capable of operations in mode A, C or S and must be using this transponder when flying in TMZ, unless stated otherwise by air navigation services provider.

Furthermore, Czech Republic provides a free Flight Information Service to VFR pilots. This service is provided by FIC Praha (Flight Information Centre). The users can access to this information using different communication frequencies depending on the region. The figure below shows how the service is segregated depending on the region for accessing to this information.

[1] No declared RMZ has been identified during the Czech AIP analysis.

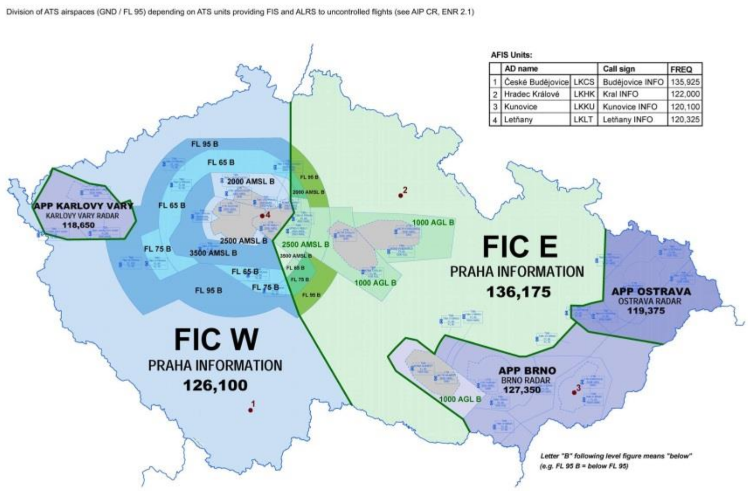


Figure 3 FIC airspace segmentation

2.1.2 Mnichovo Hradiště Airport (LKMH-CR)

Mnichovo Hradiště airport is located near to the town of Mnichovo Hradiště, Czech Republic. It holds international traffic, however, the airport suspended its activity in December 2016 and it is waiting for its operational capability certification approval (January 2017) according to the airport website[2]. From mid-January 2017, the airport is receiving only domestic traffic . The airport is eligible for aircraft up to MTOW 25 tons.

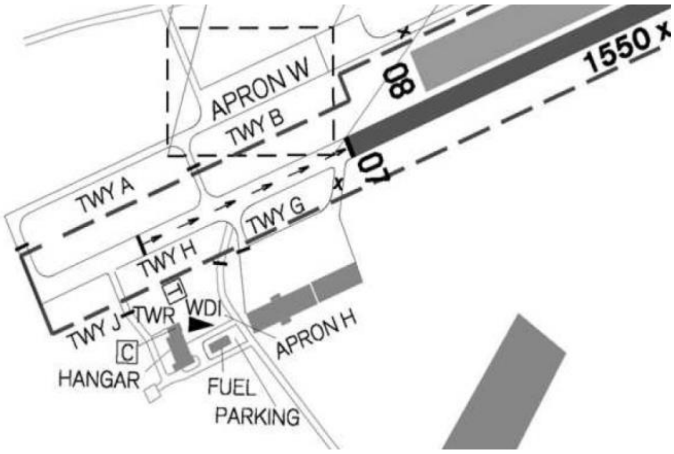


Figure 4 LKMH facilities chart close-up

The main facilities and characteristics are summarized below:

Figure 5 LKMH aerial view

Concept	Description	Additional Info
Number of Runways	*2*	*Asphalt: 1550x30m 07/25* *Grass: 1000x60m 08/26*
Hangar Capacity	*Yes*	
Fuelling Area	*Yes*	
ATS	*No*	
Airspace Classification	*ATZ*	
PAPI	*No*	
Approach lighting	*No*	
Approaches	*VFR*	*Only day*

Table 1 LKMH main characteristics

Types of serviced aircraft

- Aeroplanes
- Gliders
- Powered gliders
- Helicopters
- Ultralight aircraft

[2] http://www.lkmh.cz/

RWY	APCH	THR WBAR	PAPI	TDZ	RWY CL	RWY edge	RWY WBAR	SWY	RESA
08	ND	ND	ND	ND	ND	ND	ND	ND	ND
26	ND	ND	ND	ND	ND	ND	ND	ND	ND
07	ND	ND	ND	ND	ND	ND	ND	ND	ND
25	ND	ND	ND	ND	ND	ND	ND	ND	ND

Table 2 Runway lighting systems and visual aids in LKMH (ND = Not declared)

RWY	SWY	RESA	CWY	Strip	OFZ
07	ND	ND	ND	2200x120m	ND
25	ND	ND	ND	2200x120m	ND
08	ND	ND	ND	1200x80m	ND
26	ND	ND	ND	1200x80m	ND

Table 3 Declared limiting surfaces in LKMH (ND = Not declared)

2.1.3 Hradec Králové Airport (LKHK-CR)

Hradec Králové Airport is a public domestic and private international airport located about 3 km from Hradec Králové, in east Bohemia, Czech Republic in the town of Hradec Králové. There are currently no scheduled commercial flights operating to or from the airport, although it is sometimes visited by private jet traffic.

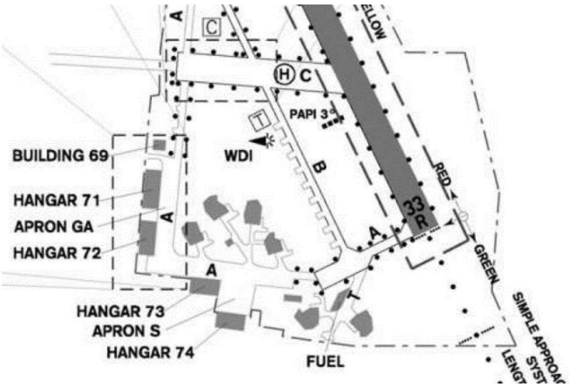


Figure 6 LKHK facilities chart close-up

The main facilities and characteristics are summarized below:

Figure 7 LKHK aerial view

Concept	Description	Additional Info
Number of Runways	*2*	*Asphalt: 2400x60m 33R/15L* *Grass: 800x25m 33L/15R*
Hangar Capacity	*Yes*	
Fuelling Area	*Yes*	
ATS	*Yes*	*AFIS*
Airspace Classification	*ATZ*	
PAPI	*Yes*	*3º*
Approach lighting	*Yes*	*SALS*
Approaches	*VFR*	*Day/Night*

Table 4 LKHK main characteristics

Types of serviced aircraft

- Cessna - series 100/200 and 300/400, Cessna 208 Caravan, Cirrus SR, Schweizer/Hugnes 269
- Piper - series Pa 23, 28, 31, 32, 34, 44
- Beech - series 90, 100, 200, B200, and 300/B300
- Eurocopter - series AS355, EC135, EC120
- Boing 737

Terrain and obstacles

Nature of the terrain around Hradec Kralove is flat. There are significant vertical gradients cant and the cant of the total. The terrain here is by no means limiting factor. According to the AIP in the vicinity LKHK located 4 obstacles (higher than 100 Metres). These are the stacks in Hradec Kralove, Jaroměř, Černožice and Opatovice.

Traffic

In 2016, Hradec Kralove Airport had around 67 651 movements.

RWY	APCH	THR WBAR	PAPI	TDZ	RWY CL	RWY edge[3]	RWY WBAR	SWY	RESA
15L	SALS 420m Intensity: Low	Colour: Green	ND	ND	ND	Length:1840m Spacing:70m Colour: White Length:560m Spacing:70m Colour: Yellow Intensity: Low	Colour: Red	ND	ND
33R	SALS 420m Intensity: Low	Colour: Green	PAPI 3º	ND	ND	Length:1840m Spacing:70m Colour: White Length:560m Spacing:70m Colour: Yellow Intensity: Low	Colour: Red	ND	ND
15R	ND	ND	ND	ND	ND	ND	ND	ND	ND
33L	ND	ND	ND	ND	ND	ND	ND	ND	ND

Table 5 Runway lighting systems and visual aids in LKHK (ND = Not declared)

RWY	SWY	RESA	CWY	Strip	OFZ
15L	ND	ND	ND	2520x150m	ND
33R	ND	ND	ND	2520x150m	ND
15R	ND	ND	ND	920x65m	ND
33L	ND	ND	ND	920x65m	ND

Table 6 Declared limiting surfaces in LKHK (ND = Not declared)

[3] Distances have been estimated from the Aerodrome charts due to lack of specification.

2.1.4 České Budějovice Airport (LKCS-CR)

Originally a military airport, since 2006, České Budějovice only operates general aviation traffic. It is licensed for the status of the "Non-Public International Aerodrome" with the external limited border.

It was planned to expand the airport to accommodate A320/B737 traffic but the project was reduced to a simple facilities improvement and rehabilitation of the runway. The works are scheduled to finish by 2018-2019.

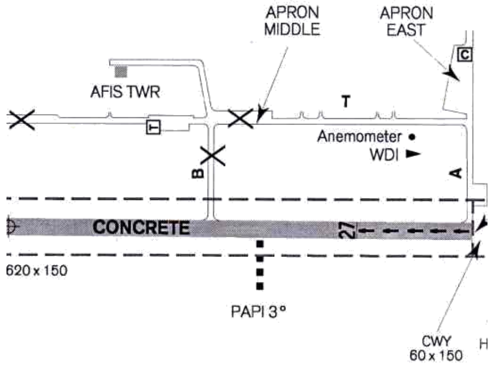


Figure 8 LKCS facilities chart close-up

The main facilities and characteristics are summarized below:

Figure 9 LKCS aerial view

Concept	Description	Additional Info
Number of Runways	*2*	*Asphalt: 2400x60m 33R/15L* *Grass: 800x25m 33L/15R*
Hangar Capacity	*Yes*	
Fuelling Area	*Yes*	
ATS	*Yes*	*AFIS*
Airspace Classification	*ATZ*	
PAPI	*Yes*	*3º*
Approach lighting	*No*	
Approaches	*VFR*	*Only Day*

Table 7 LKCS main characteristics

Types of serviced aircraft

Not defined

RWY	APCH	THR WBAR	PAPI	TDZ	RWY CL	RWY edge	RWY WBAR	SWY	RESA
09	ND	ND	ND	ND	ND	ND	ND	ND	ND
27	ND	ND	PAPI 3º	ND	ND	ND	ND	ND	ND

Table 8 Runway lighting systems and visual aids in LKCS (ND = Not declared)

RWY	SWY	RESA	CWY	Strip	OFZ
09	ND	130x90m	60x150m	2620x150m	ND
27	ND	130x90m	60x150m	2620x150m	ND

Table 9 Declared limiting surfaces in LKCS (ND = Not declared)

2.2 Background and previous experiences

This section aims to prove that similar European aerodromes have successfully implemented GNSS procedures. The main task is to contrast the Czech Republic aerodromes infrastructure and operations with European aerodromes eligible for GNSS approach procedures. Thereafter, determine whether Czech Republic aerodromes require infrastructure investment according to ICAO minimum requirements for this type of procedures. The airports considered for this European benchmarking are the following:

- Czech Republic
  - Mnichovo Hradiště (LKMH)
  - Hradec Králové (LKHK)
  - České Budějovice (LKCS)
- Hungary
  - Békéscsaba Repülőtér Airport (LHBC)
- Norway
  - Stord Sørstokken Airport (ENSO)
  - Vardø Svartnes Airport (ENSS)
- Portugal
  - Vila Real Airport (LPVR)
- Germany
  - Straubing Wallmühle Airport (EDMS)
  - Allendorf Eder Airport (EDFQ)
- United Kingdom
  - Brighton City/Shoreham Airport (EGKA)
- Spain
  - Teruel Airport (LETL)

Before detailing each of these airports, a table summarising their main features is provided below. This table tries to present an overview of the differences between the Czech airports and the rest of airports analysed.

	LKCS	LKHK	LKMH	LHBC	ENSO	ENSS	LPVR	EDMS	EDFQ	EGKA	LETL
Runway (m)	2499x 45	2400x 60	1550x 30	1300x 30	1460x 30	1145x 30	946x 30	1350x 30	1240x 30	1036x 17	2825x 45
Elevation (m)	432	241	244	87	49	13	558	321	355	2	1026
ATS	AFIS	AFIS	No	AFIS	AFIS	AFIS	AFIS	AFIS	AFIS	TWR	No
Approaches	VFR	VFR	VFR	GNSS NDB	LNAV	GNSS SCAT-I	LNAV	LNAV, LNAV/ VNAV, LPV	LNAV, LNAV/ VNAV	LNAV NDB/ DME	VFR
Airport Type	Civil	Civil	Civil	Civil	Civil	Civil	Civil	Civil	Civil	Civil	Civil
Approach Lighting	No	SALS 420 m	No	SALS 420 m	CL / XBAR	CL / XBAR	No	SALS +ident	SALS	No	No
Airport Light Intensity	No	Low	No	Me-dium	High	High	Low	High	High	Low	Low
Threshold Lighting	No	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recommended ICAO Strip Size	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	No	Yes
PAPI	Yes	Yes	No	Yes	Yes	PLASI	Yes	Yes	Yes	Yes	Yes

Table 10 Czech Republic and European aerodromes comparative

The following subsections address the detail of each of the abovementioned European airports in order to provide an understanding of the facilities and operations of other similar airports that have already implemented or are in process of implementing IFR approach procedures.

2.2.1 Békéscsaba Repülőtér Airport (LHBC-HU)

Békéscsaba Repülőtér Airport is a civil airport located in Hungary near to the Romanian frontier. In 2006 the airport underwent substantial modernization which included paving of the main runway and taxi ways and modern lighting. In December 2008 an upgrade of the hangars has been completed which can now accommodate 8-seater aircraft.

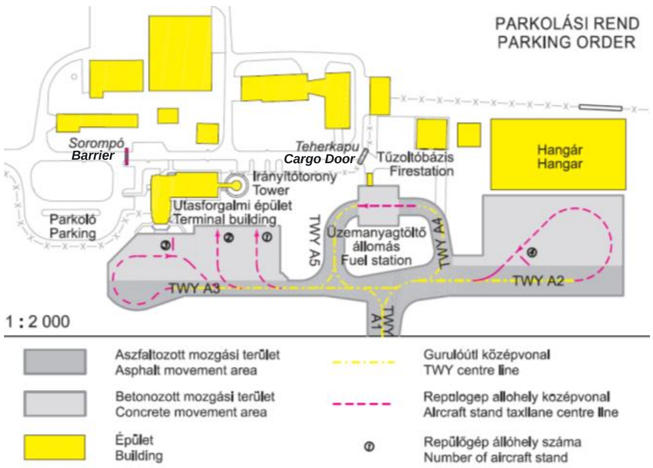


Figure 10 LHBC facilities chart close-up

The main facilities and characteristics are summarized below:

Figure 11 LHBC aerial view

Concept	Description	Additional Info
Number of Runways	*2*	*Asphalt: 1300x30m 17l/35R Grass:790x40m 17R/35L*
Hangar Capacity	*8-seater Aircraft*	
Fuelling Area	*Yes*	*AVGAS JET*
ATS	*Yes*	*AFIS Provision*
Airspace Classification	*F*	
PAPI	*Yes*	
Approach lighting	*Yes*	
Approaches	*GNSS|NDB*	

Table 11 LHBC main characteristics

The airport main activities contemplate pilot training and recreational traffic including sky-diving. This Hungarian airport shares significant similarities with Hradec Králové Airport (LKHK) in terms of infrastructure.

RWY	APCH	THR WBAR	PAPI	TDZ	RWY CL	RWY edge	RWY WBAR	SWY	RESA
17L	ND	Colour: Green	ND	ND	ND	Length:1300m Spacing:59m Colour: White Intensity: Medium	Colour: Red	ND	ND
35R	SALS 420m Intensity: Medium	Colour: Green	PAPI 3º	ND	ND	Length:1300m Spacing:59m Colour: White Intensity: Medium	Colour: Red	ND	ND
17R	ND	ND	ND	ND	ND	ND	ND	ND	ND
35L	ND	ND	ND	ND	ND	ND	ND	ND	ND

Table 12 Runway lighting systems and visual aids in LHBC (ND = Not declared)

RWY	SWY	RESA	CWY	Strip	OFZ
17L	ND	ND	ND	1420 x 150m	ND
35R	ND	ND	ND	1420 x 150m	ND
17R	ND	ND	ND	910 x 75m	ND
35L	ND	ND	ND	910 x 75m	ND

Table 13 Declared limiting surfaces in LHBC (ND = Not declared)

Regarding the approach procedures declared for LHBC, a conventional NDB approach and an RNAV (GNSS – RNAV1) approach have been identified for each of the runway ends. The figures below are extracts from these published procedures.

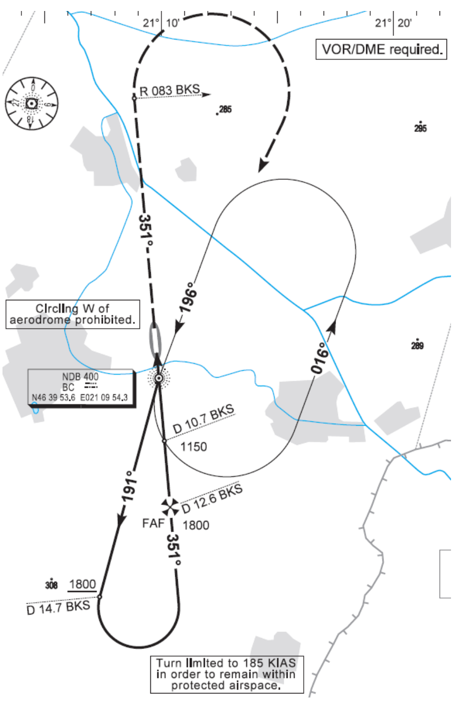


Figure 12 LHBC NDB approach for RWY35

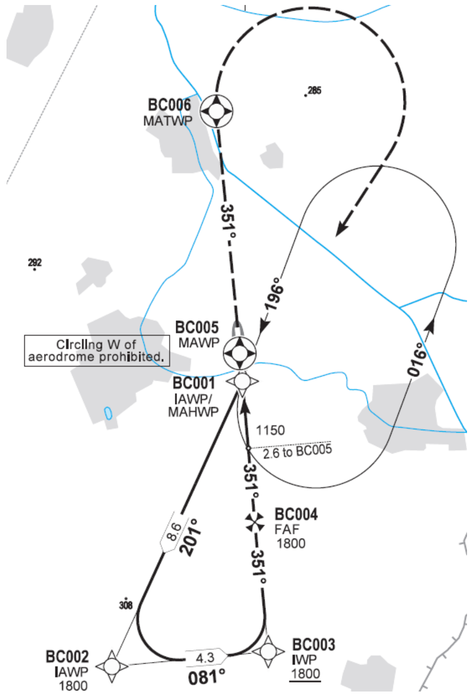


Figure 13 LHBC RNAV approach for RWY35

2.2.2 Stord Sørstokken Airport (ENSO-NO)

Stord Sørstokken Airport is a municipal regional airport located at Sørstokken in Stord, a municipality in Hordaland county, Norway. The airport opened on 25 October 1985. It received instrument landing system in 1986, which was also the first year with regular flights.

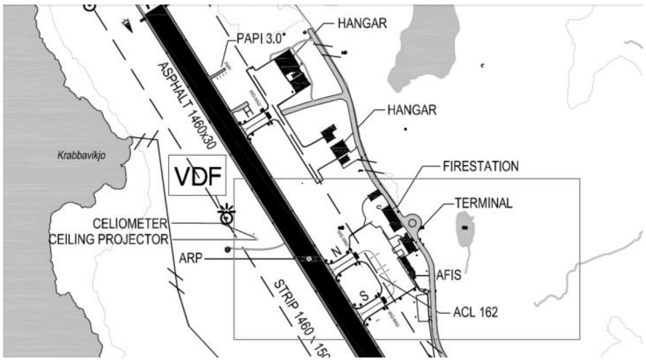


Figure 14 ENSO facilities chart close-up

The main facilities and characteristics are summarized below:

Figure 15 ENSO aerial view

Concept	Description	Additional Info
Number of Runways	*1*	*Asphalt: 1460x30m 14/32*
Hangar Capacity	*-*	
Fuelling Area	*Yes*	*JET A-1/ Oil*
ATS	*No*	*AFIS Provision*
Airspace Classification	*G*	
PAPI	*Yes*	
Approach lighting	*Yes*	
Approaches	*LNAV (GNSS)*	

Table 14 ENSO main characteristics

RWY	APCH	THR WBAR	PAPI	TDZ	RWY CL	RWY edge	RWY WBAR	SWY	RESA
14	SALS 180m Intensity: High	Colour: Green	PAPI 3º	ND	Length:1260m Spacing:60m Colour: White Intensity: High	Length:780m Spacing:60m Colour: White Length:420m Spacing:60m Colour: Yellow Intensity: Medium	Colour: Red	ND	2 blue LGT on each side of RWY 4 blue LGT at ASPH end
32	SALS 180m Intensity: High	Colour: Green	PAPI 3º	ND	Length:1260m Spacing:60m Colour: White Intensity: High	Length:780m Spacing:60m Colour: White Length:420m Spacing:60m Colour: Yellow Intensity: Medium	Colour: Red	ND	2 blue LGT on each side of RWY 4 blue LGT at ASPH end

Table 15 Runway lighting systems and visual aids in ENSO (ND = Not declared)

RWY	SWY	RESA	CWY	Strip	OFZ
14	ND	120x80m	600x150m	1460x150m	ND
32	ND	120x80m	600x150m	1460x150m	ND

Table 16 Declared limiting surfaces in ENSO (ND = Not declared)

Regarding the approach procedures declared for ENSO, a conventional approach (LOC for RWY14 and VOR for RWY32) and an RNAV (LNAV, LNAV/VNAV) approach have been identified for each of the runway ends. The figures below are extracts from these published procedures.

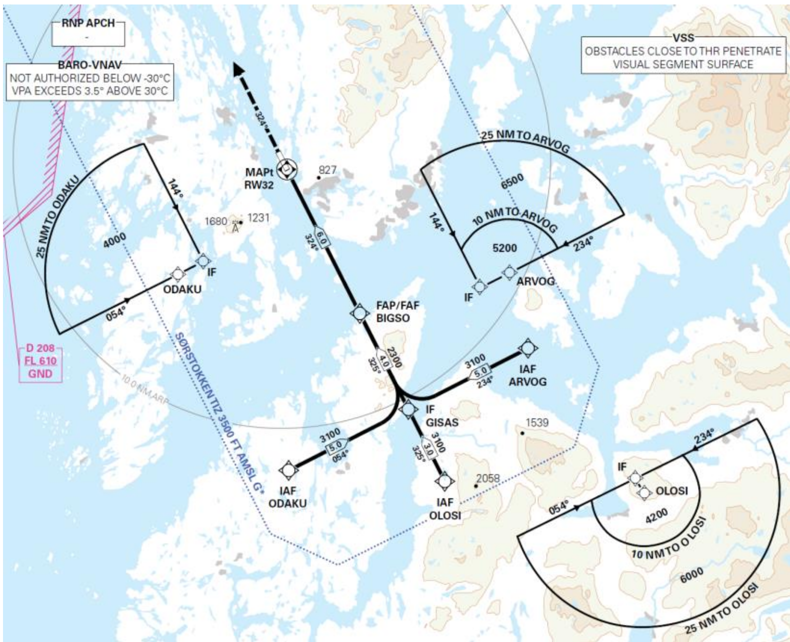
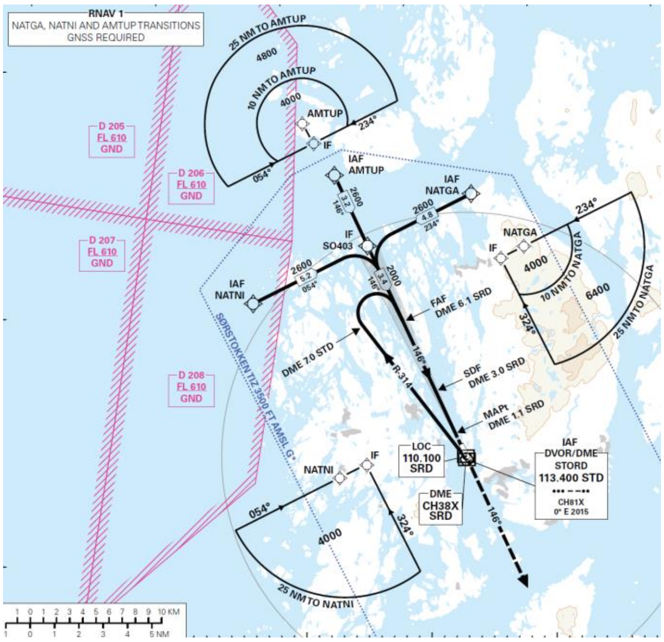


Figure 16 ENSO RNAV approach (LNAV, LNAV/VNAV) for RWY32



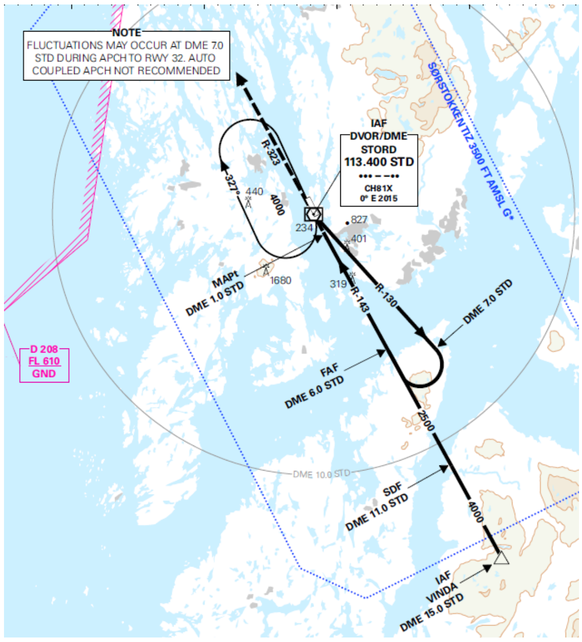


Figure 17 ENSO LOC approach for RWY14

Figure 18 ENSO VOR approach for RWY32

2.2.3 Vardø Svartnes Airport (ENSS-NO)

Vardø Svartnes Airport is a short take-off and landing airport located at Svartnes in Vardø Municipality in Finnmark county, Norway. The airport has a single terminal building which has an integrated control tower. The passenger terminal has a capacity for thirty passengers per hour. The airport is located 4 kilometers (2.5 mi) driving from the town centre. Taxis are available at the airport. In 2012 the airport had 13,889 passengers, 2,518 aircraft movements and 0.7 tonnes of cargo handled.

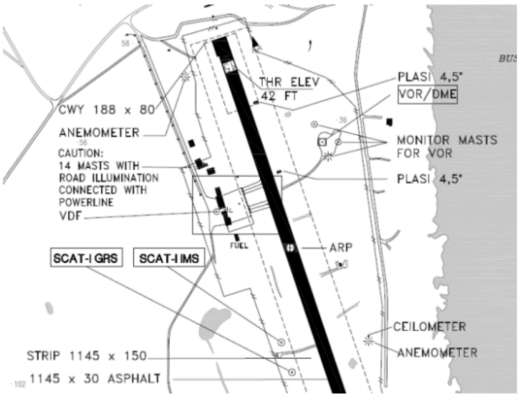


Figure 19 ENSS facilities chart close-up

The main facilities and characteristics are summarized below:

Figure 20 ENSS aerial view

Concept	Description	Additional Info
Number of Runways	*1*	*Asphalt: 1460x30m 14/32*
Hangar Capacity	*No*	
Fuelling Area	*Yes*	*JET A-1*
ATS	*No*	*AFIS Provision*
Airspace Classification	*G*	
PAPI	*Yes*	
Approach lighting	*Yes*	
Approaches	*GNSS 4.0 SCAT-I*	

Table 17 ENSS main characteristics

RWY	APCH	THR WBAR	PAPI	TDZ	RWY CL	RWY edge	RWY WBAR	SWY	RESA
15	CAT I 288m Intensity: Low/High	Colour: Green	PLASI 4.5º	ND	Length:1025m Spacing:50m Colour: White Intensity: Low	Length:601m Spacing:50m Colour: White Length:303m Spacing:50m Colour: Yellow Intensity: High	Colour: Red	ND	ND
33	CAT I 288m Intensity: Low/High	Colour: Green	PLASI 4.5º	ND	Length:1025m Spacing:50m Colour: White Intensity: Low	Length:637m Spacing:50m Colour: White Length:267m Spacing:50m Colour: Yellow Intensity: Low	Colour: Red	ND	ND

Table 18 Runway lighting systems and visual aids in ENSS (ND = Not declared)

RWY	SWY	RESA	CWY	Strip	OFZ
15	ND	120x80m	180x80m	1145x150m	ND
33	ND	120x80m	188x80m	1145x150m	ND

Table 19 Declared limiting surfaces in ENSS (ND = Not declared)

Regarding the approach procedures declared for ENSS, a conventional approach (VOR), a GLS approach and an RNAV (LNAV, LNAV/VNAV) approach have been identified for each of the runway ends. The figures below are extracts from these published procedures.

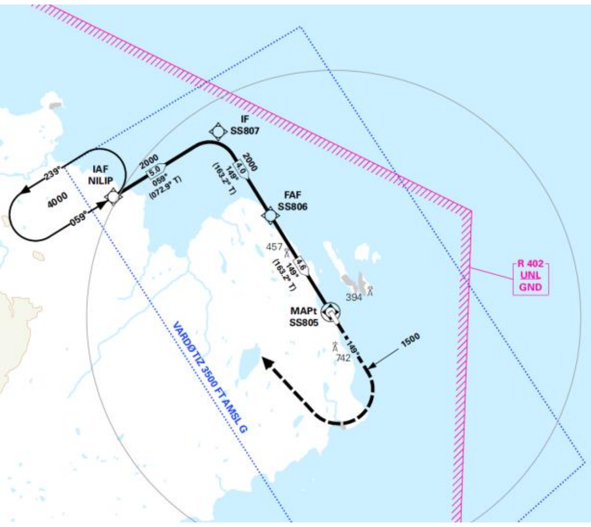


Figure 22 ENSS RNAV approach for RWY15

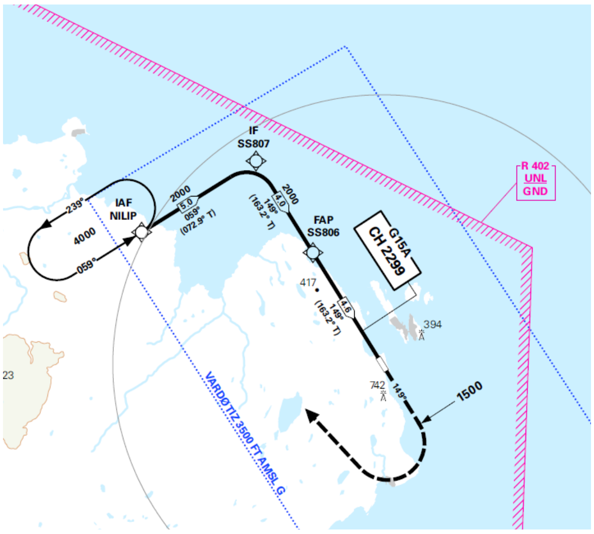


Figure 21 ENSS GLS approach for RWY15

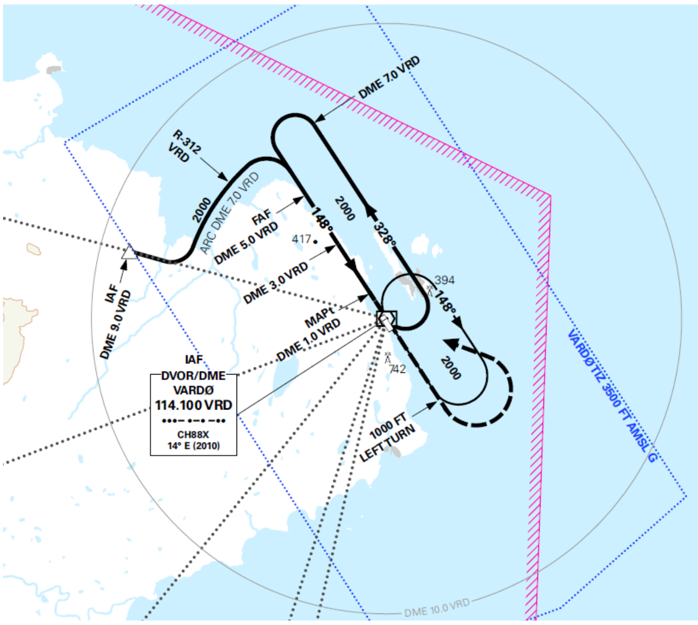


Figure 23 ENSS VOR approach for RWY15

2.2.4 Vila Real Airport (LPVR-PO)

Vila Real airport is located in Nova de Cima village, in the city of Vila Real, Portugal. It is a small airport focused on the business sector and general aviation.

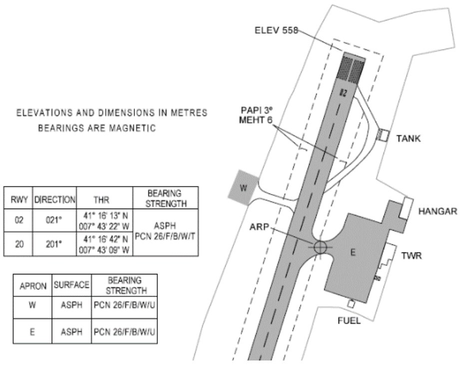


Figure 24 LPVR facilities chart close-up

The main facilities and characteristics are summarized below:

Figure 25 LPVR aerial view

Concept	Description	Additional Info
Number of Runways	*1*	*Asphalt: 1460x30m 14/32*
Hangar Capacity	*Yes*	*1176 m² of capacity*
Fuelling Area	*Yes*	*JET A-1*
ATS	*Yes*	*AFIS Provision*
Airspace Classification	*G*	
PAPI	*Yes*	
Approach lighting	*Yes*	
Approaches	*GPS VOR/DME*	

Table 20 LPVR main characteristics

RWY	APCH	THR WBAR	PAPI	TDZ	RWY CL	RWY edge	RWY WBAR	SWY	RESA
02	SALS	Colour: Green	PAPI 3º	ND	ND	Length:586m Spacing:60m Colour: White Length:360m Spacing:60m Colour: Orange Intensity: Low	Colour: Red	ND	ND
20	SALS	Colour: Green	PAPI 3º	ND	ND	Length:586m Spacing:60m Colour: White Length:360m Spacing:60m Colour: Orange Intensity: Low	Colour: Red	ND	ND

Table 21 Runway lighting systems and visual aids in LPVR (ND = Not declared)

RWY	SWY	RESA	CWY	Strip	OFZ
02	ND	ND	ND	1006x60m	ND
20	ND	ND	ND	1006x60m	ND

Table 22 Declared limiting surfaces in LPVR (ND = Not declared)

Regarding the approach procedures declared for LPVR, only a RNAV (GNSS-LNAV) approach has been identified. The figure below is an extract from the Portuguese AIP.

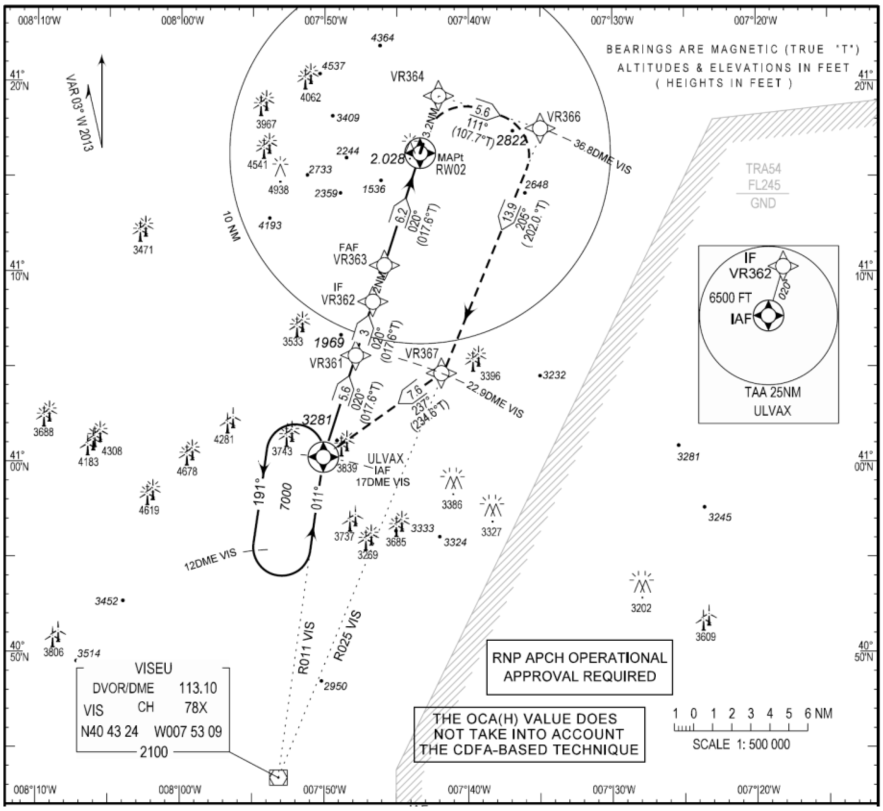


Figure 26 LPVR RNAV (LNAV) approach for RWY02

2.2.5 Straubing Wallmühle Airport (EDMS-DE)

Straubing Wallmühle Airport is a minor German regional airport, located about 3 miles north-northwest of Straubing in Bavaria. It is used for general aviation. The airport was built in 1938 as a Luftwaffe airfield, its primary mission being the training of military pilots.

Due to the extensive offer, the establishment of the Straubing-Wallmühle transport land area has reached an important position for the region. At present, almost 200 people are employed at the airport, with an increasing trend.

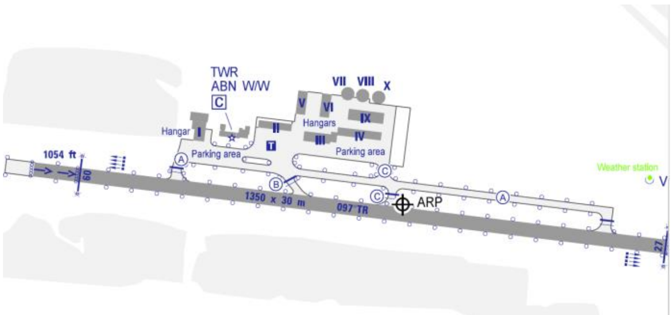


Figure 27 EDMS facilities chart close-up

The main facilities and characteristics are summarized below:

Figure 28 EDMS aerial view

Concept	Description	Additional Info
Number of Runways	*1*	*Asphalt: 1460x30m 14/32*
Hangar Capacity	*Yes*	
Fuelling Area	*Yes*	*AVGAS 100 LL, Jet A1/ 80, 100, D-80, D-100, Multi Grade*
ATS	*Yes*	*AFIS Provision*
Airspace Classification	*G RMZ*	
PAPI	*Yes*	
Approach lighting	*Yes*	
Approaches	*GPS*	

Table 23 EDMS main characteristics

RWY	APCH	THR WBAR	PAPI	TDZ	RWY CL	RWY edge	RWY WBAR	SWY	RESA
09	ND	VRB Colour: Green Intensity: High	PAPI 3°	ND	ND	VRB Colour: White Intensity: High	VRB Colour: Red Intensity: High	ND	ND
27	SALS 420m Colour: White Sequence Flash available Intensity: Low/High	VRB Colour: Green Intensity: High	PAPI 3°	ND	ND	VRB Colour: White Intensity: High	VRB Colour: Red Intensity: High	ND	ND

Table 24 Runway lighting systems and visual aids in EDMS (ND = Not declared)

RWY	SWY	RESA	CWY	Strip	OFZ
09	ND	ND	ND	1470x150m	ND
27	ND	ND	ND	1470x150m	ND

Table 25 Declared limiting surfaces in EDMS (ND = Not declared)

Regarding approach procedures, EDMS has defined only GNSS RNAV procedures and no conventional IFR approach procedures are defined.

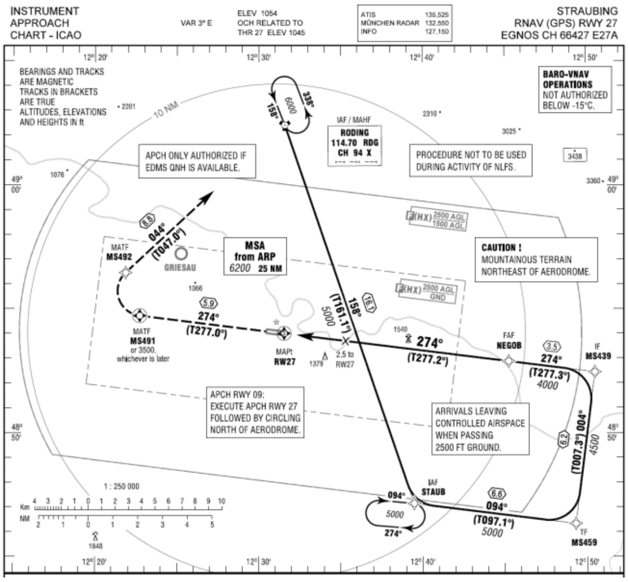


Figure 29 EDMS RNAV RWY 27

2.2.6 Allendorf Eder Airport (EDFQ-DE)

The airfield Allendorf / Eder is an airfield in Hesse Allendorf. It is located 1 km north of the municipality in Ederbergland district Waldeck-Frankenberg and is the basis of the directly adjacent Viessmann Werke.

According to Viessmann, one-third of all flight movements are attributable to the business flight operation, in which, in addition to business trips from company members to domestic and foreign customers, customers are also given the opportunity to visit the plant in Allendorf.

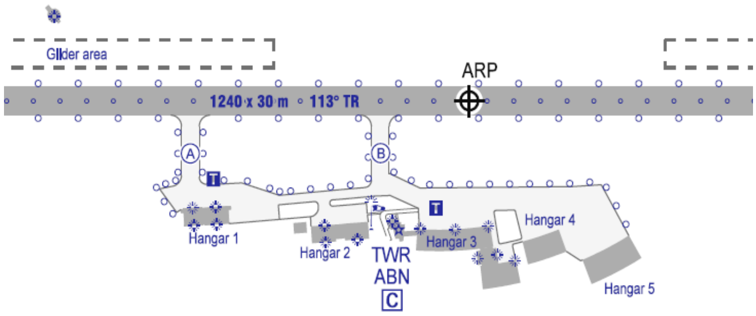


Figure 30 EDFQ facilities chart close-up

The main facilities and characteristics are summarized below:

Figure 31 EDFQ aerial view

Concept	Description	Additional Info
Number of Runways	*1*	*Asphalt: 1460x30m 14/32*
Hangar Capacity	*Yes*	*O/R*
Fuelling Area	*Yes*	*AVGAS 100 LL, Jet A1*
ATS	*Yes*	*AFIS Provision*
Airspace Classification	*G RMZ*	
PAPI	*Yes*	
Approach lighting	*Yes*	
Approaches	*LNAV/VNAV (EGNOS)*	

Table 26 EDFQ main characteristics

RWY	APCH	THR WBAR	PAPI	TDZ	RWY CL	RWY edge	RWY WBAR	SWY	RESA
11	ND	VRB Colour: Green Intensity: High	ND	ND	Spacing: 30m Colour: White	VRB Colour: White Intensity: High	VRB Colour: Red Intensity: High	ND	ND
29	SALS 150m Colour: White Intensity: Low/High	VRB Colour: Green Intensity: High	PAPI 3°	ND	Spacing: 30m Colour: White	VRB Colour: White Intensity: High	VRB Colour: Red Intensity: High	ND	ND

Table 27 Runway lighting systems and visual aids in EDFQ (ND = Not declared)

RWY	SWY	RESA	CWY	Strip	OFZ
11	ND	ND	150x150m	1360x150m	ND
29	ND	ND	60x150m	1360x150m	ND

Table 28 Declared limiting surfaces in EDFQ (ND = Not declared)

Regarding approach procedures, EDFQ has defined only GNSS RNAV procedures and no conventional IFR approach procedures are defined.

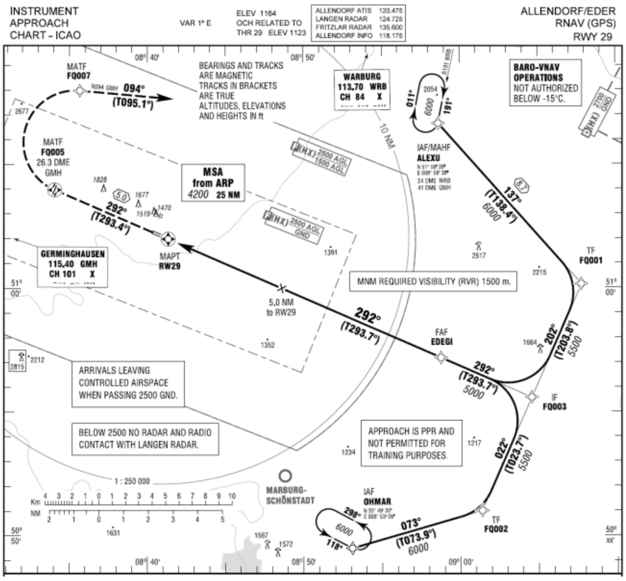


Figure 32 EDFQ RNAV (GPS) RWY29

2.2.7 Brighton City/Shoreham Airport (EGKA-UK)

Shoreham Airport, also known as Brighton City Airport, is an airport located in the parish of Lancing near Shoreham-by-Sea in West Sussex, England. It has a CAA Public Use Aerodrome Licence that allows flights for the public transport of passengers or for flying instruction.

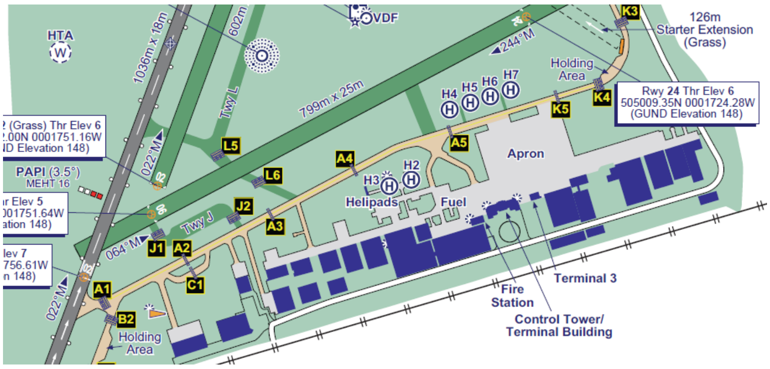


Figure 33 EGKA facilities chart close-up

The main facilities and characteristics are summarized below:

Figure 34 EGKA aerial view

Concept	Description	Additional Info
Number of Runways	*4*	*Asphalt: 1036x18m 02/20* *Grass:799x25m 06/24* *Grass:408x18m 13/31* *Grass:602x23m 02/20*
Hangar Capacity	*Yes*	*Limited*
Fuelling Area	*Yes*	*AVGAS AVTUR*
ATS	*Yes*	*ATC*
Airspace Classification	*G*	
PAPI	*Yes*	
Approach lighting	*No*	
Approaches	*GPS NDB/DME*	

Table 29 EGKA main characteristics

Regarding the operability of the airport:

RWY	APCH	THR WBAR	PAPI	TDZ	RWY CL	RWY edge	RWY WBAR	SWY	RESA
02	ND	Colour: Green Intensity: Low	PAPI 3.5º	ND	ND	Omnidirectional LI	Colour: Red Intensity: Low	ND	ND
20	ND	Colour: Green Intensity: Low	PAPI 4.5º	ND	ND	Omnidirectional LI	Colour: Red Intensity: Low	ND	ND

Table 30 Runway lighting systems and visual aids in EGKA (ND = Not declared)

RWY	SWY	RESA	CWY	Strip	OFZ
11	ND	ND	ND	ND	ND
29	ND	ND	ND	ND	ND

Table 31 Declared limiting surfaces in EGKA (ND = Not declared)

Regarding approach procedures EGKA has defined a set of conventional approaches using NDB/DME for RWY 02 and RWY 20 and VDF procedure for RWY 02 and GNSS RNAV approach procedures to both runways.

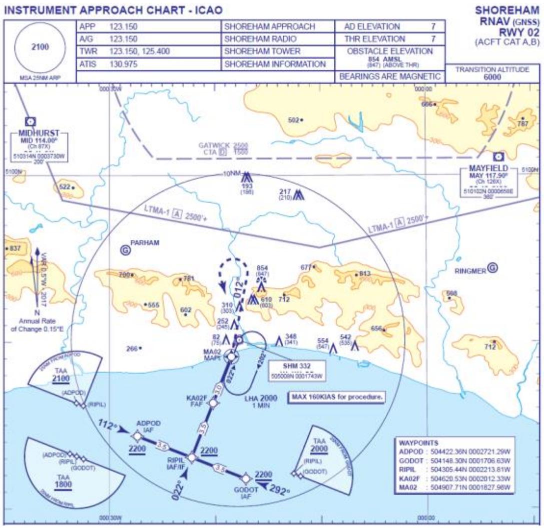


Figure 35 Instrument approach chart RNAV (GNSS) RWY 02 at EGKA

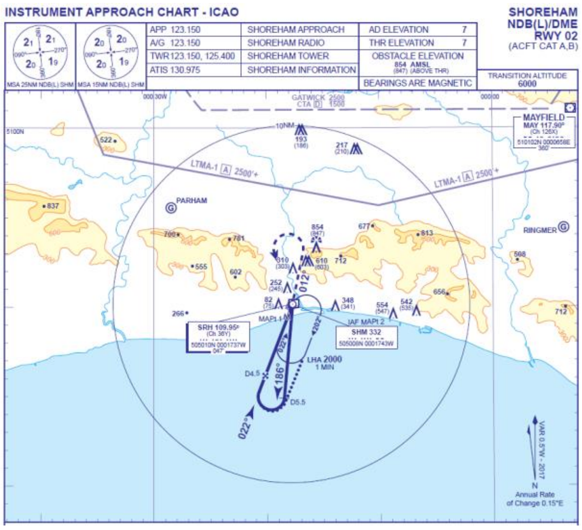


Figure 36 Instrument approach chart NDB(L)/DME (GNSS) RWY 02 at EGKA

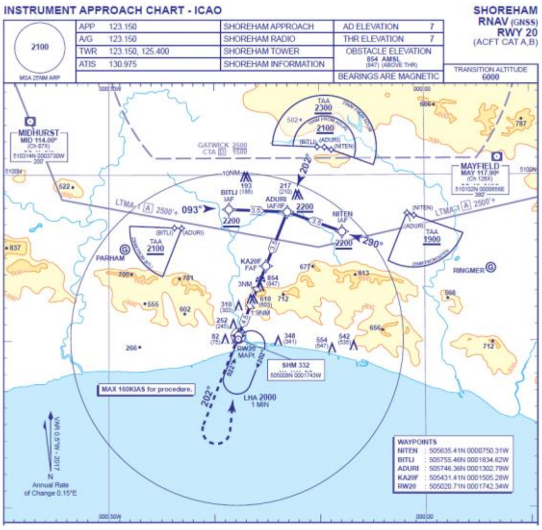


Figure 37 Instrument approach chart RNAV (GNSS) RWY 20 at EGKA

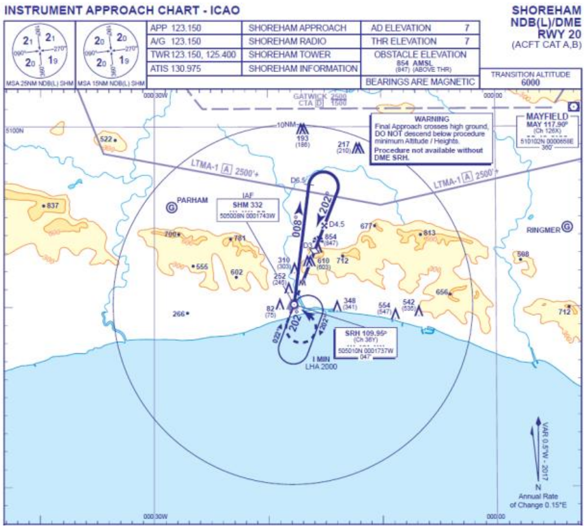


Figure 38 Instrument approach chart NDB(L)/DME (GNSS) RWY 20 at EGKA

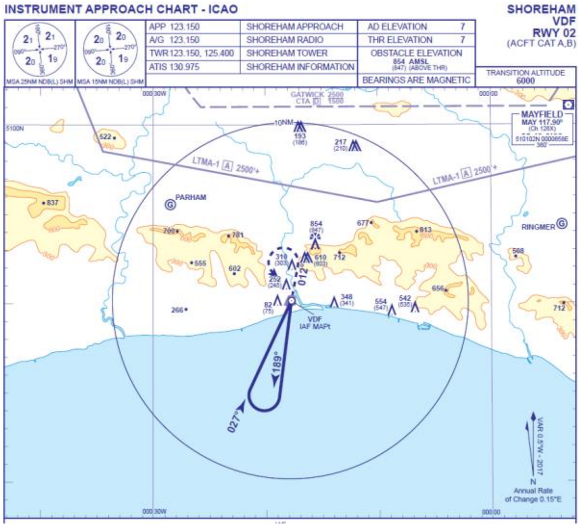


Figure 39 Instrument approach chart VDF RWY 02 at EGKA

2.2.8 Teruel Airport (LETL-ES)

Teruel Airport is a MRO airport, dedicated to aircraft storage, aircraft maintenance and aircraft recycling. Hence, it does not operate any passenger or cargo traffic. Plataforma Aeroportuaria-Teruel (PLATA) is the airport operator and was certified for public use by the Spanish Aviation Safety and Security Agency (AESA) in 2013.

Teruel Airport is one of the only airports in Spain that do not belong to the AENA airport network. Nevertheless, PLATA (its airport operator) is owned by a consortium formed by the regional and local governments.

Located among some of the main Spanish cities (Madrid, Barcelona, Zaragoza and Valencia), Teruel has a population of around 35.000 inhabitants. Its airport used to be a Spanish Air Force base, sold to the local government, which was the promoter of its transformation into a MRO airport given its low potential to become a commercial passenger airport. Another feature favouring this development was its dry and sunny weather.

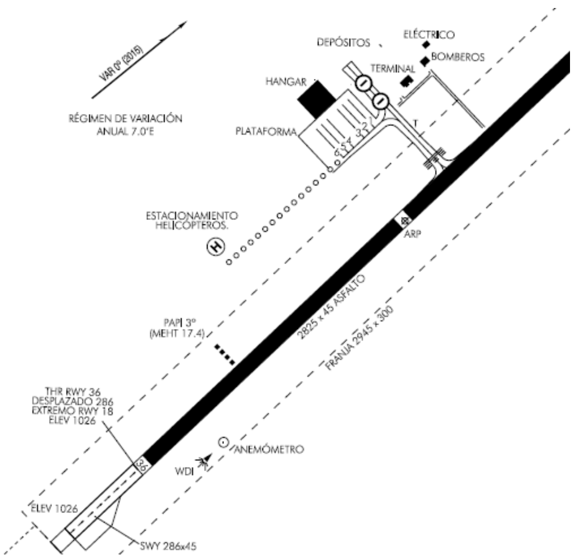


Figure 40 LETL facilities chart close-up

Regarding its facilities, Teruel Airport includes the following:

Figure 41 LETL aerial view

Concept	Description	Additional Info
Number of Runways	*1*	*Asphalt: 2539x45m RWY18 – 2825x45m RWY36*
Hangar Capacity	*Yes*	*6.500 m²*
Fuelling Area	*Yes*	*JET A-1*
ATS	*No*	
Airspace Classification	*G*	*Teruel ATZ*
PAPI	*Yes*	*3º / 3,2º*
Approach lighting	*No*	
Approaches	*VFR*	

Table 32 LETL main characteristics

In addition, Teruel airport provides the following facilities and services:

- 27.200 m² aircraft maintenance platform;
- 120 ha. airport apron, the largest in Europe, suitable for up to 225 aircraft;
- 33 ha. Industrial area for enterprises;
- a hangar suitable for aircraft such as a Boeing 747;
- a general services terminal and a fire extinguisher station.

However, Teruel Airport does not operate ground navaids and does not have ATC service. It has no TMA airspace enclosing its aerodrome ATZ: Teruel ATZ (5NM radius and Class G) from surface up to 2000 feet.

Due to the lack of approach lighting, Teruel Airport is only authorized for VFR operations (daylight), even though its runway and taxiway are illuminated and PAPI is available. Therefore, no IFR procedures are currently defined. There is no ATS and the local radio frequency is used for communication among airspace users (air to air). Automatic meteorological services is broadcasted 24 hours.

RWY	APCH	THR WBAR	PAPI	TDZ	RWY CL	RWY edge	RWY WBAR	SWY	RESA
18	ND	Colour: Green	PAPI 3º	ND	ND	Length: 1939m, Colour: White, Spacing: 60 m Length: 600m, Colour: Yellow, Spacing: 60 m Intensity: Low	Colour: Red	Colour: Red, Intensity: Low	ND
36	ND	Colour: Green	PAPI 3,2º	ND	ND	Length: 286m, Colour: Red, Spacing: 60m Length: 1939m, Colour: White, Spacing: 60 m Length: 600m, Colour: Yellow, Spacing: 60 m Intensity: Low	Colour: Red	ND	ND

Table 33 Runway lighting systems and visual aids in LETL (ND = Not declared)

RWY	SWY	RESA	CWY	Strip	OFZ
18	286 x 45m	150 x 184m	ND	2945 x 300m	ND
36	ND	150 x 240m-	ND	2945 x 300m	ND

Table 34 Declared limiting surfaces in LETL (ND = Not declared)

During 2016, there was a project whose aim was to study the feasibility of applying UK CAA's CAP1122 (IFR procedures at uncontrolled aerodromes) to Teruel airport. The project included an analysis of technical and regulatory requirements, an analysis of GNSS performance, procedure design drafts and a preliminary safety assessment.

The relevance of this project lies in the fact that Teruel Airport is now receiving category C and D traffic (large jets) and the traffic is rapidly increasing (388% yearly increase in October 2016). In addition, potential customers (airlines) are reluctant to VFR approaches and an opportunity for passengers flights (small aircraft) has been identified. However, the trade-off between the potential safety concerns and the business impact of the project needed to be reviewed.

The conclusions of the project recommended the installation of approach lights, to update its terrain and obstacle study and to perform a study of GNSS performance. Moreover, it was proposed to provide an AFIS on demand service and to set up a cylinder-shape FIZ with 25NM radius. Lastly, a safety assessment was conducted based on these conclusions.

Safety assessment

The scope of the safety assessment included the description of the functional change, an initial definition of CONOPS and the feasibility of missed approach based on dead-reckoning to cope with loss of GNSS navigation, which was one of the main major safety concerns from AESA.

The CONOPS definition encompassed the description of the potential IFR operations (and AFIS) availability and the IFR operations constraints, mainly considering PPR and that only 1 IFR traffic will be operated within the FIZ at any time.

The proposal for a missed approach needed to consider that there were no ground navaids as back-up and no ATC service. An adapted dead-reckoning PANS-OPS design criteria (15º drift) was used for the proposal. As a whole, a worst-case study analysing the location of GNSS loss was performed with positive results.

Other proposed safety mitigations were the use of a dual RNAV system, stringent mid-term GNSS availability requirements and continuous local GNSS performance monitoring to ensure the applicability of the proposed procedures.

The project conclusions were focused on the challenging process to publish RNP approaches in such an airport, mainly due to the definition of suitable CONOPS, the integration with surrounding airspace and the development of a specific Safety Assessment. In addition, the bureaucracy process in this regard may be highly time-consuming. Nevertheless, it should be borne in mind that with a little investment, IFR approaches can be achieved.

2.2.9 European CAAs experiences: IFR operations in uncontrolled aerodromes

2.2.9.1 Germany

In order to ensure IFR flight operations at uncontrolled aerodromes, a group of experts comprising representatives of the Federal Ministry of Transport and Digital Infrastructure (BMVI), the federal Supervisory Authority for Air Navigation Services (BAF), DFS as well as airspace user groups (Military Aviation, Commercial Aviation, General Aviation) and aerodrome associations developed a new airspace model that complies with SERA/ICAO. This new airspace model entailed the establishment of radio mandatory zones (RMZ) in Class G airspace in the immediate vicinity of these aerodromes. Furthermore the Class E airspace will be lowered locally to 1000 ft AGL.

In the new airspace model, the established procedures and requirements for IFR flight operations were kept as far as possible. This restructuration of the airspace was implemented in 2014. Figure 42 shows the airspace modification over a dummy aerodrome.

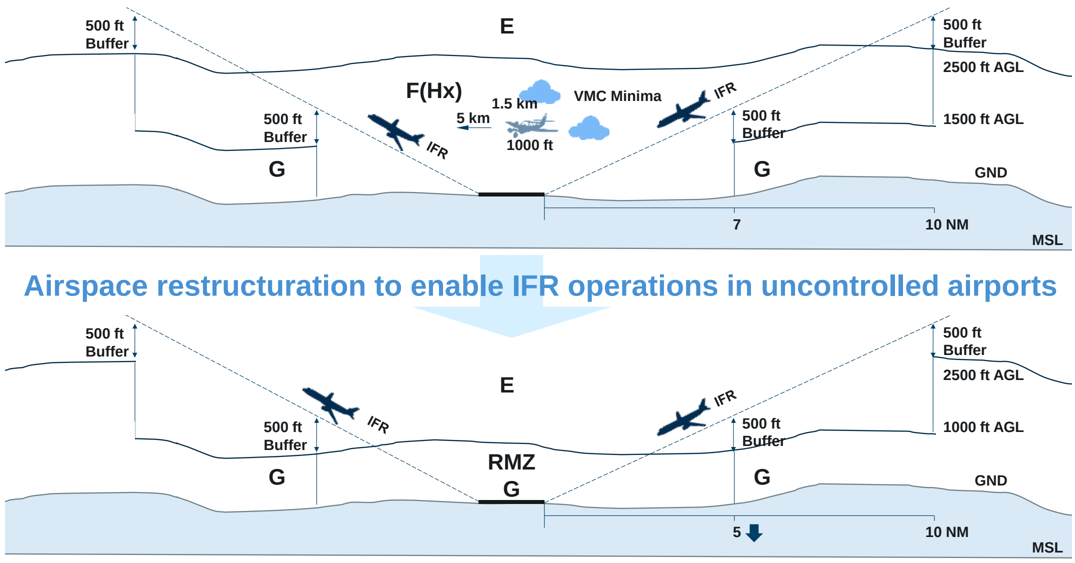


Figure 42 Airspace structural changes for enabling IFR flight operations in uncontrolled aerodromes, issued in 2014, Germany

2.2.9.2 United Kingdom

Instrument Runways requirements in the United Kingdom are defined in the CAP 168. Both precision and non-precision instrument runways have to meet minimum standards for runway strip dimensions, obstacle limitation surfaces, holding points, signs, markings and aeronautical ground lightning. Runways which do not meet these requirements are known as non-instrument runways.

In the UK, GNSS –based instrument approaches had been approved for use at a number of aerodromes in conformance with a specific set of policy requirements: aerodromes must be licensed, the GNSS approach must be to an instrument runway, an Approach Control service must be provided, aerodrome survey information must be current and appropriate, the aircraft conducting such an approach must be suitably equipped and the pilot qualified to conduct the flight procedure.

A moment came in which that policy combined with the associated costs, rendered provision of an IAP outside of the financial reach of many smaller aerodromes. Up to that moment, only a relatively small number of UK aerodromes offered any form of instrument approach. Moreover, the costs associated to ground-based infrastructure meant that many aerodromes opted to provide less costly and potentially less safe non-precision approaches based on conventional navigation aids. It must also be considered that conventional en-route navigation aids such as NDB and VOR are currently being phased out. All in all, the lower costs associated with use of GNSS technology make it more financially attractive to aerodrome operators, particularly those without conventional navigation aids, who might wish to develop and IAP.

A significant proportion of Controlled Flight-Into-Terrain (CFIT) accidents occur during non-precision approaches. Then, safety benefits come from having increased availability of instrument approach procedures to UK aerodromes. Wider provision of GNSS approaches with vertical guidance also better facilitates the initiatives sponsored by ICAO e.g. Assembly Resolution 37-11. The joint CAA/Industry CFIT Task Force concluded that “The major factors involved in fatal accidents and serious incidents are circling and non-precision approaches” and recommended that the CAA engaged with EASA / EUROCONTROL / ICAO to increase the rate at which traditional non-precision approaches (NPAs) are replaced by GNSS equivalents.

It is also worth mentioning that in the UK in order to accommodate specific requirements such as the need to support isolated communities served by remote aerodromes with very few movements, some UK commercial aircraft operators have, historically, been granted exceptional CAA approval to use instrument approach procedures, commonly referred to as Discrete Instrument Approach Procedures (DIAPs). These DIAPs have been designed solely for use by the individual aircraft operating company, in most cases for the purposes of public transport operations, and are not published in the UK AIP.

Within the context mentioned above, an IAP approval policy facilitating the wider deployment of GNSS approaches with vertical guidance was seen as a catalyst for the implementation of this significant safety recommendation. The Civil Aviation Authority published a Civil Aviation Publication tackling the application for instrument approach procedures to aerodromes without an instrument runway and / or approach control, the CAP1122, which aims to promulgate CAA policy for the process of approving the establishment of Instrument Approach Procedures (IAPs) to runways which do not meet instrument runway criteria and /or at certain aerodromes which do not provide an Approach Control service. In their view, a more progressive policy requires a change in regulatory approach from one based upon standards to one based on risk. Then, applicants need to consider the mitigations against risk which are provided by current standards and to provide safety assurance arguments which are specific to the particular aerodrome and airspace environment, showing how the associated risks can be mitigated locally by other means where the current requirements are not achieved.

It must be noted, though, that safety cases must demonstrate and guarantee safety levels where standards are not fully complied. For example, it is considered very unlikely that a cogent safety argument could be made for an IAP to be established which would introduce instrument traffic at a busy aerodrome with an active visual traffic pattern without provision of approach service.

Therefore, applicants to notify instrument approach on non-instrument runways or without an Approach control service must present an acceptable safety case in which alternative safety arrangements are described. These safety arrangements need to mitigate those provisions that are normally covered by the standard instrument runway or approach control service namely the risk of CFIT, mid-air collision, collision on the runway, runway excursion and other relevant accident types. In addition to that, any changes to Airspace and Air Traffic services need to be properly managed in accordance with current regulation.

The following tables summarise the combinations of aerodrome configuration and ATS provision that fall within the scope of the initial implementation of this policy with the following colour code:

- Green: permitted at present
- Amber 1: First stage of risk-based regulatory approach, applications considered on a case-by-case basis subject to safety analysis
- Amber 2: Second stage of risk-based regulatory approach after first stage is complete, and, when further associated policy has been developed, applications considered on a case-by-case basis subject to safety analysis
- RED: not normally prepared to consider applications at this stage. Some may be potential areas for future consideration, following experience gained from early stages

		ATS				No ATS	
Aerodrome	**Runway**	**Approach control**	**Aerodrome instrument**	**Aerodrome visual**	**AFISO**	**AGCS**	**SafetyCom**
Public Transport Operations							
Licensed	**Instrument**	G	A1	A1	A1	R	N/A
	Non-instrument	A1	A1	A1	A1	R	R
Unlicensed[4]	**Non-instrument**	N/A	N/A	N/A	N/A	R	R
Operations other than Public Transport							
Licensed	**Instrument**	G	A1	A1	A1	A1	N/A
	Non-instrument	A1	A1	A1	A1	A1	A1
Unlicensed[4]	**Non-instrument**	N/A	N/A	N/A	N/A	A2	A2

Table 35 Proposed scope of revised policy at UK

2.2.9.3 Spain

In Spain, the minimum requirements for APV approaches are a non-precision instrument runway, the AFIS provision (within a FIZ) and the provision of local QNH (MET). Teruel Airport has been the first example of uncontrolled aerodrome aiming to implement RNP approaches. For an uncontrolled airport as the ones considered in this report, the tasks to be performed would be the following:

- Transform the runway into a non-precision instrument runway (as stated in ICAO Annex 14) without the installation of ground navaids.
    - Installation of adequate approach lights (SALS with a minimum length of 420 meters).
    - Study of the GNSS performance, leading to a satisfactory availability.
- Update of its terrain and obstacle study in order to assess that the OLS for non-precision approach runways (as defined in ICAO Annex 14) are not violated.
- Provide an AFIS on demand to serve IFR traffic.
- Minimize changes to existing airspace around the aerodrome.
    - Cylinder-shape FIZ with 25NM radius.
    - Interface with a controlled airspace close to the uncontrolled aerodrome.

[4] Although some unlicensed aerodromes may have runways which meet many of the required criteria, the absence of a license and associated safeguarding activity, means that such runways cannot be considered to be instrument runways. They are therefore depicted only as non-instrument runways in the table

2.3 IFR procedures possibilities

The general requirements derived from each of the various RNP APCH approach procedures have been gathered in this chapter, describing both non-precision 2D approaches (LNAV and LP) and APV 3D approaches (LNAV/VNAV and LPV).

Traditionally, there have been two types of Instrument Approach Procedure:

- **Precision Approach** (PA) uses for the final approach segment an instrument landing system (e.g. ILS, GBAS, MLS) which provides both lateral and vertical guidance on a geometrically defined continuous descent path.
- **Non-Precision Approach** (NPA) uses for the final approach segment, conventional navigation aids (e.g. NDB, VOR, DME) or basic **GNSS** (e.g. GPS) and provide only lateral guidance along the final approach segment.

LNAV, LNAV/VNAV, LPV and LP are different levels of approach service and are used to distinguish the various minima lines on the RNAV (GNSS) chart. The minima line to be used depends on the aircraft capability and approval.

LNAV – Lateral Navigation. The minima line on the chart for RNP Approaches without vertical guidance

LNAV/VNAV – the minima line based on Baro-VNAV system performances that can be used by aircraft approved. LNAV/VNAV minima can also be used by SBAS capable aircraft.

LPV – Localiser Performance with Vertical Guidance: the minima-line based on SBAS performances that can be used by aircraft approved.

LP - At some airports, it may not be possible to meet the requirements to publish an approach procedure with LPV vertical guidance. This may be due to: obstacles and terrain along the desired final approach path, airport infrastructure deficiencies, or the inability of SBAS to provide the desired availability of vertical guidance (i.e., an airport located on the fringe of the SBAS service area). When this occurs, a State may provide an LP approach procedure based on the lateral performance of SBAS. The LP approach procedure is a non-precision approach procedure with angular lateral guidance equivalent to a localizer approach. As a non-precision approach, an LP approach procedure provides lateral navigation guidance to a minimum descent altitude (MDA); however, the SBAS integration provides no vertical guidance.

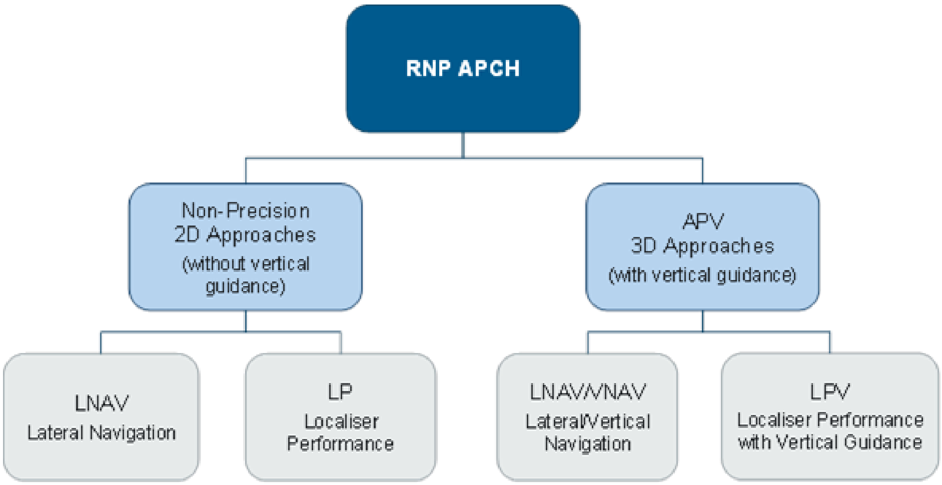


Figure 43 Approach procedures breakdown classification

RNAV approaches are described by a series of waypoints, legs, altitude and speed constraints published and stored in the on-board navigation database.

GNSS-based RNAV capabilities were initially used to fly NPA procedures. These procedures are published with a Minimum Descent Altitude/Height (MDA/H), as with any conventional NPA procedure. The MDA/H is indicated in the LNAV minima line on the RNAV (GNSS) instrument approach chart. Hence, the LNAV approach procedure can be considered as the baseline.

It is essential to bear in mind that no modifications to the cockpit instruments are in principle necessary to use RNP APCH on-board.

The important distinction between the different types of RNP APCH operations is the **provision of vertical guidance**. RNP APCH to LNAV and LP minima include only lateral guidance and are published with a MDA while RNP APCH procedures with vertical guidance (APV) are published with a DA, which may be lower than the MDA thus potentially increasing airport accessibility. In addition, the provision of vertical guidance improves pilot situational awareness, thus improving safety.

Approaches with vertical guidance (APV)

In addition to lateral RNAV capabilities, modern multi-sensor RNAV systems provide a VNAV function which allows a vertical path to be flown with a constant rate of descent based on the Barometric altimeter, or on GPS augmented SBAS position. Provision of both lateral and vertical guidance may also be based on LPV capability of an aircraft.

The RNAV procedures using Barometric VNAV for vertical guidance are called APV Baro VNAV and are flown to a Decision Altitude/Height indicated in the LNAV/VNAV minima line on the chart. Aircraft equipped with SBAS systems can also fly procedures designed for APV Baro VNAV if the State publishing the procedure permits it.

For RNP APCH to LNAV/VNAV minima, the theoretical vertical descent profile is defined by a geometrical path with fixed flight path angle. The vertical path angle is computed between 50ft above the runway threshold and a final capture point which corresponds to the location of the FAF associated with the NPA RNP APCH. The final path starts when the aircraft intersects the vertical final guidance. But this point of intersection is very close to FAF of NPA RNP APCH. Given that the vertical path is based on barometric inputs, it is very important that the correct local pressure setting (QNH) is entered into the system (this should be transmitted using **AFIS**). The final descent is also influenced by temperature: temperature limits are published on the chart.

RNP APCH to LPV minima is based on **GNSS core constellation and SBAS**. The vertical guidance is angular and the final approach segment profile is defined in the Final Approach Segment Data Block (FAS DB). The vertical path angle is defined (not computed) and published in degrees (mainly 3°).

RNP APCH has the potential to provide **better minima** than conventional Non- Precision Approach. Consequently, **better airport accessibility** can be achieved at those airports without precision approach capability, as well as at airports where precision approach aid is out of service.

Additionally, RNP APCH also brings improved **situational awareness** for the pilots in both the horizontal and vertical domain (in the case of APV), as well as the means to perform a **stabilised approach**, both of which contribute to **improve safety**.

Note that **all three levels of RNP APCH can be published on a single chart** only in the case where the procedure design solution for LNAV does not utilize step-down fixes within the final approach segment. In this case, it is recommended that RNP APCH (LNAV) and RNP APCH (LNAV/VNAV and/or LPV) should be published on separate charts.

It is recommended that, whenever possible, all three levels of RNP APCH procedure be implemented at the same time for a particular runway.

Regarding its implementation, ICAO EUR RNP APCH Guidance Material recommends the consideration of six elements during the assessment of the need to implement RNP APCH, as stated in Figure 44. Additional comments are provided below for a better understanding.

ICAO Assembly Resolution A37-11 presents RNP APCH to LNAV minima as an acceptable alternative to APV in places where APV implementation is not possible or does not make sense as no aircraft are suitably equipped for APV operations. This could be the case for small airports with

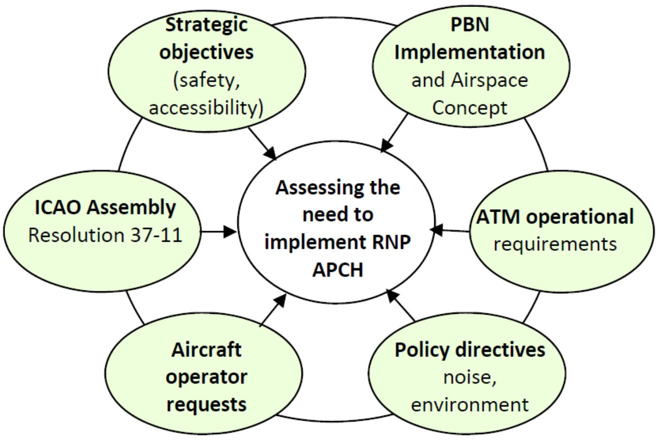


Figure 44 Factors to consider for RNP APCH implementation

only general aviation. RNP APCH implementation is part of the resolution for ICAO PBN deployment, the main objective of which is to improve safety.

ICAO **strategic objectives** include the increase of safety, airport accessibility and pilot situational awareness, as it was mentioned in the previous chapters of this report.

With the widespread availability of GNSS-based RNAV and VNAV capability on many types of aircraft, operators may want to encourage RNP Approaches to be published so that they might benefit from these on-board capabilities. The **aircraft operators** could be motivated by better airport accessibility or improved safety.

At country level, States may have already identified the need for RNP APCH implementation through the publication of a **PBN implementation plan** or through the development of a PBN compliant Airspace Concept.

Whereas at the European Level, the European ATM Master Plan and SESAR ATM Concept for 2020+ are the main guidelines on this area. Moreover, Approach Procedures with Vertical Guidance are part of the near term Operational Improvement Steps, Enhancing Terminal Area, as identified by the European ATM Master Plan and Work Program.

Lastly, potential **policy directives** for noise and environment demanding changes to arrival and departure routes may stimulate the need to implement RNP APCH operations.

ICAO RNP APCH requirements

ICAO defines a non-precision instrumental runway as the one served by visual aids and non-visual aid(s) intended for landing operations following an instrument approach operation type A and a visibility not less than 1 000 m., as mentioned in ICAO Annex 14.

PANS-OPS, Doc 8168 specifies the requirements and procedures to define a GNSS NPA and APV. It states that current GNSS avionics standards support APV-I and APV-II. On the other hand, GNSS systems have been used to define LNAV/VNAV approaches.

According to ICAO GNSS Manual (Doc 9849), APV GNSS approaches are subjected to:

- Width and length of runway strip;
- Obstacles within the approach obstacle limitation surface;
- Availability of appropriate meteorological information;
- Adequacy of runway edge lighting and marking;
- Taxiway configuration.

RNAV GNSS approaches can be approved provided that:

- The GNSS equipment is serviceable and must be approved by the State of the Operator and fulfil the specifications of EUROCAE ED-72DA;
- The pilot has a current knowledge of how to operate the equipment so as to achieve optimum level of navigation performance;
- Satellite availability is checked to support the intended operation;
- An alternate airport with conventional navaids has been selected;
- The procedure is retrievable from an airborne navigation database;
- Receiver Autonomous Integrity Monitoring (RAIM) shall be available;
- The RAIM alert limits in approach procedures shall be set at ±0.6km;
- Prior to flying the system shall review all the NOTAMs regarding GNSS IFR operations.

A more detailed analysis of applicable regulation, particularly at EU and local level is being carried out in parallel to this task and will be documented in the CONOPS deliverable. For the time being, a list of applicable regulations has been identified as part of the regulatory basis analysis. This list can be found in Chapter 4.References – CZCAA IFR Study Regulatory Basis.

2.4 Interaction with the CZCAA to establish criteria

After this detailed analysis of the current situation of the three Czech airports and the selection of similar European airports, the similarities between them reveal the feasibility of implementing IFR procedures at these three uncontrolled airports, implementing modifications to either infrastructure, visual aids and Air Traffic Services.

In the previous section, an in-depth analysis of the potential RNP approaches has been performed. Depending on the type of procedures that is desirable at each airport the requirement modifications and upgrades will be of major impact and therefore, more costly to the aerodrome. Taking into consideration the expectations of the CZCAA in this project and the guidelines indicated, it is recommended to implement Non-Precision Approaches or APVs. Nonetheless, final decision is subject to the revision of this document by the CZCAA and the feedback brought by them in light with the results obtained.

2.5 Preliminary Conclusions

As the final step of this General Feasibility Assessment, the preliminary conclusions have been gathered in this section. They include the findings derived from the combination of the comparative analysis between the selected Czech airports and other similar European airports and the IFR procedures possibilities. The conclusions are the following:

- LKHK is the most well equipped and biggest airport from the selected Czech Republic aerodromes and its infrastructure superior or comparable to the NPA approved European airports. Therefore, the implementation of IFR NPAs seems highly feasible in terms of facilities and operations.
- LKCS and LKMH will require more important upgrades to their current equipment, such as adequate lighting systems consisting of a 420 meters SALS in order to ensure safety and enable IFR traffic, as stated in L-14.
- **AFIS** implementation is a requirement to implement IFR procedures at LKMH, being the only of the three Czech uncontrolled airports lacking this service. Furthermore, all the European studied airports with IFR operations are provided with at least AFIS.
- Some countries, such as Germany, have declared special zones to deal with GNSS IFR approaches in non-controlled airspaces such as RMZ. Czech regulation already defines these kind of zones even though according to the AIP Czech Republic no RMZ is declared in the whole Czech Republic.
- Regarding the preliminary regulation assessment and based on the current investigation of IFR regulative requirements, the implementation of IFR on uncontrolled airports seems feasible because IFR NPAs have been implemented in EU states in which the same EU legislation is in force. The applicable regulations do not block this project and its implementation but to meet the regulative requirements (resulting from e.g. 216/2008 and 139/2014) will cause substantial costs to aerodrome operators.
- The applicable international regulation (ICAO Annex 14) as applied to the Czech regulation through L-14 states that an aerodrome shall have proper visual aids and at least one directional instrumental system to enable non-precision IFR approaches. Even though, no specifications are detailed about visual aids, all the European aerodromes studied include edge, PAPI/PLASI and threshold lights as a minimum standard.
- Among the different options available defining **RMZ** zones in G airspaces, the German case, is one of the feasible scenario for the studied Czech airports as current regulation already provides with the means of RMZ and therefore, only the declaration of the zones would be required (from a regulatory perspective).
- The historical data and the benchmark performed reflect that GNSS IFR approaches in non-controlled aerodromes are a **feasible option** according to the European regulation.
- Given the current situation of the studied Czech airports, their type of traffic and facilities, it is proposed to focus on the implementation of **IFR non-precision approaches and APVs** as an initial step. However, LPV 200 (Cat I) can be studied in case the CZCAA considers it suitable and necessary for any of the aerodromes. Nevertheless, interactions with the CZCAA and affected airspaces users would be of the utmost importance to determine the most suitable type of IFR approach for these three airports.

3 Abbreviations and Definitions

AESA	Spanish Air Safety Agency
AFIS	Aerodrome Flight Information Service
AFISO	Aerodrome Flight Information Service Officer
AGCS	Air/Ground Communication System
AGL	Above Ground Level
AIP	Aeronautical Information Publication
ALG	Advanced Logistics Group
APAC	Austrian Product Assurance Company
APCH	Approach
APV	Approach procedures with Vertical Guidance
ASPH	Asphalt
ATC	Air Traffic Control
ATM	Air Traffic Management
ATS	Air Traffic Services
ATZ	Aerodrome Traffic Zone
BAF	Federal Supervisory Authority for Air Navigation Services
BMVI	Federal Ministry of Transport and Digital Infrastructure
CAA	Civil Aviation Authority
CAP	Civil Aviation Publication (UK)
CFIT	Control Flight Into Terrain
CL	Centre Line
CONOPS	Concept of Operations
CR	Czech Republic
CTU	Czech Technical University in Prague, Faculty of Transportation Sciences
CWY	Clearway
CZCAA	Civil Aviation Authority of the Czech Republic
DE	Germany
DFS	Deutsche Flugsicherung GmbH
DIAP	Discrete Instrument Approach Procedure
DME	Distance Measuring Equipment
EASA	European Aviation Safety Agency
EDFQ	Allendorf Eder Airport
EDMS	Straubing Wallmühle Airport
EGKA	Brighton City/Shoreham Airport
EGNOS	European Geostationary Navigation Overlay Service
ENSO	Stord Sørstokken Airport
ENSS	Vardø Svartnes Airport
ES	Spain

FAF	Final Approach Fix
FAS DB	Final Approach Segment Data Block
FIC	Flight Information Centre
FIZ	Flight Information Zone
GALILEO	European Satellite Positioning Constellation
GBAS	Ground Based Augmentation System
GLS	GNSS Landing System
GNSS	Global Navigation Satellite System
GPS	Global Positioning System
HU	Hungary
IAP	Instrument Approach Procedure
ICAO	International Civil Aviation Organization
IFR	Instrument Flight Rules
ILS	Instrument Landing System
LETL	Teruel Airport
LGT	Light
LHBC	Békéscsaba Repülőtér Airport
LKCS	České Budějovice Airport
LKHK	Hradec Králové Airport
LKMH	Mnichovo Hradiště Airport
LNAV	Lateral Navigation
LNAV/VNAV	Lateral Navigation / Vertical Navigation
LOC	Localiser
LP	Localiser Performance
LPV	Localiser Performance with Vertical Guidance
LPVR	Vila Real Airport
MDA/H	Minimum Descent Altitude/Height
MET	Meteorology
MLS	Microwave Landing System
MRO	Maintenance Repair and Overhaul
MTOW	Maximum Take-Off Weight
ND	Not Declared
NDB	Non Directional Beacon
NO	Norway
NOTAM	Notice to Airmen
NPA	Non Precision Approach
OFZ	Obstacle Free Zone
OLS	Obstacle Limitation Surface
PA	Precision Approach
PANS-OPS	Procedures for Air Navigation Services - Aircraft Operations

PAPI	Precision Approach Path Indicator
PBN	Performance Based Navigation
PLASI	Pulse Light Approach Slope Indicator
PLATA	Plataforma Aeroportuaria-Teruel
PO	Portugal
QNH	Atmospheric Pressure at Nautical Height
RAIM	Receiver Autonomous Integrity Monitoring
RESA	Runway End Safety Area
RMZ	Radio Mandatory Zone
RNAV	Area Navigation
RNP	Required Navigation Performance
RWY	Runway
SALS	Simple Approach Lighting System
SBAS	Satellite-Based Augmentation Systems
SCAT-I	Special Category 1
SERA	Standardised European Rules of the Air
SESAR	Single European Sky & ATM Research
SWY	Stopway
TDZ	Touchdown Zone
THR	Threshold
TMA	Terminal Manoeuvring Area
TMZ	Transponder Mandatory Zone
UK	United Kingdom
VFR	Visual Flight Rules
VOR	VHF Omnidirectional Range
VRB	Variable
WBAR	Wing BAR lights
XBAR	Cross Bar

4 References – CZCAA IFR Study Regulatory Basis

Apart from the documents used as references for the elaboration of this assessment, which are listed in section 4.1. General Feasibility Assessment references, a regulatory basis review has been conducted at this stage of the project.

For the evaluation of the current EU regulatory basis for the project area and further compliance assessment of suggested national legislation changes with EU legislation in force, it is necessary to determine the current regulatory basis related to the project. The project regulatory basis is divided into two levels:

1. Local level identifying local regulations, standards and requirements of the Czech Republic which are related to the project scope.
2. International level identifying EU legislation, international standards and requirements related to the project scope. The international level covers:
   a. EU legislation in force (e.g. Regulations, Implementing Regulations, Directives etc.);
   b. EASA NPAs, Decisions and Opinions;

c. ICAO Annexes, Documents, Circulars, Standards and other manuals;
d. EUROCONTROL Standards, requirements and other manuals.

4.1 General Feasibility Assessment references

For the preparation of the present document, the following references mainly regarding aeronautical information have been taken into consideration:

- Aeronautical Information Publication (AIP) of the Czech Republic
- VFR Manual Czech Republic
- Aeronautical Information Publication (AIP) of Hungary
- Aeronautical Information Publication (AIP) of Norway
- Aeronautical Information Publication (AIP) of Portugal
- Aeronautical Information Publication (AIP) of Germany
- Aeronautical Information Publication (AIP) of the United Kingdom
- Aeronautical Information Publication (AIP) of Spain
- CAP 1122 – Application for instrument approach procedures to aerodromes without an instrument runway and/or approach control / UK Civil Aviation Authority / September 2014
- German AIC VFR – Future IFR flight operations at uncontrolled aerodromes – Establishment of radio mandatory zones (RMZ) / DFS / 17 April 2014
- RNAV Approach Implementation Support Group (RAiSG) 11 – LPVTeruel project: Implementation at non-instrument runways / November 2016
- ICAO Global Navigation Satellite System (GNSS) Manual (Doc 9849) / - / First Edition / 2005
- ICAO Annex 14 – Aerodromes, Volume I: Aerodrome Design and Operations / - / Seventh Edition / July 2016
- ICAO EUR RNP APCH Guidance Material (EUR Doc 025)/ - / First Edition / European and North Atlantic Office of ICAO / December 2012
- ICAO Procedure for Air Navigation Services – Aircraft Operations (PANS-OPS), Doc 8168 – Volume I: Flight Procedures / - / Fifth Edition / 2006

4.2 Local Level

Ref.	Document
[R01]	Aviation Regulation L2 - Rules of the Air, amendment 45 (transposed ICAO Annex 2 with additions based on EU legislation and Czech specifics) / Ministry of Transport of the Czech Republic / 2016-11-10
[R02]	Aviation Regulation L3 - Meteorology, amendment 77-A (transposed ICAO Annex 3 with additions based on EU legislation and Czech specifics) / Ministry of Transport of the Czech Republic / 2016-11-10
[R03]	Aviation Regulation L10/II - Aeronautical Telecommunications; Volume II - Communication Procedures, amendment 90 (transposed ICAO Annex 10, Vol II) / Ministry of Transport of the Czech Republic / 2016-11-10
[R04]	Aviation Regulation L11 - Air Traffic Services, amendment 50-A (transposed ICAO Annex 11 with additions based on EU legislation and Czech specifics) / Ministry of Transport of the Czech Republic / 2016-11-10
[R05]	Aviation Regulation L14 - Aerodromes, amendment 13-A (transposed ICAO Annex 14 and Czech specifics) / Ministry of Transport of the Czech Republic / 2016-11-10
[R06]	Aviation Regulation L4444 - Procedures for Air Navigation Services – Air Traffic Management, amendment 1/CR, correction 2/CR (transposed ICAO DOC 4444 and Czech specifics) / Ministry of Transport of the Czech Republic / 2016-02-04
[R07]	Aviation Regulation L8168 - Procedures for Air Navigation Services – Aircraft Operations, amendment 7 (transposed ICAO DOC 8168, Vol. I) / Ministry of Transport of the Czech Republic / 2016-11-10

Ref.	Document
[R08]	Aviation Regulation L7030 - European Regional Supplementary Procedures, amendment 6 (transposed ICAO DOC 7030 with Czech specifics) / Ministry of Transport of the Czech Republic / 2013-10-17

4.3 International Level

4.3.1 EU Legislation

Ref.	Document
[R09]	Regulation (EC) No 550/2004 of the European Parliament and of the Council of 10 March 2004 on the provision of air navigation services in the single European sky (the service provision Regulation) / European Parliament, Council of the European Union / 2004-03-10
[R10]	Regulation (EC) No 1070/2009 of the European Parliament and of the Council of 21 October 2009 amending Regulations (EC) No 549/2004, (EC) No 550/2004, (EC) No 551/2004 and (EC) No 552/2004 in order to improve the performance and sustainability of the European aviation system / European Parliament, Council of the European Union / 2009-10-21
[R11]	Regulation (EC) No 216/2008 of the European Parliament and of the Council of 20 February 2008 on common rules in the field of civil aviation and establishing a European Aviation Safety Agency, and repealing Council Directive 91/670/EEC, Regulation (EC) No 1592/2002 and Directive 2004/36/EC / European Parliament, Council of the European Union / 2008-02-20
[R12]	Regulation (EC) No 1108/2009 of the European Parliament and of the Council of 21 October 2009 amending Regulation (EC) No 216/2008 in the field of aerodromes, air traffic management and air navigation services and repealing Directive 2006/23/EC / European Parliament, Council of the European Union / 2009-10-21
[R13]	Commission Regulation (EC) No 1033/2006 of 4 July 2006 laying down the requirements on procedures for flight plans in the pre-flight phase for the single European sky / European Commission / 2006-07-04
[R14]	Commission Implementing Regulation (EU) No 428/2013 of 8 May 2013 amending Regulation (EC) No 1033/2006 as regards the ICAO provisions referred to in Article 3(1) and repealing Regulation (EU) No 929/2010 / European Commission / 2013-05-08
[R15]	Commission Implementing Regulation (EU) 2016/2120 of 2 December 2016 amending Regulation (EC) No 1033/2006 as regards the provisions referred to in Article 3(1) / European Commission / 2016-12-02
[R16]	Commission Regulation (EU) No 255/2010 of 25 March 2010 laying down common rules on air traffic flow management / European Commission / 2010-03-25
[R17]	Commission Implementing Regulation (EU) 2016/1006 of 22 June 2016 amending Regulation (EU) No 255/2010 as regards the ICAO provisions referred to in Article 3(1) / European Commission / 2016-06-22
[R18]	Commission Implementing Regulation (EU) No 1035/2011 of 17 October 2011 laying down common requirements for the provision of air navigation services and amending Regulations (EC) No 482/2008 and (EU) No 691/2010 / European Commission / 2011-10-17
[R19]	Commission Implementing Regulation (EU) No 448/2014 of 2 May 2014 amending Implementing Regulation (EU) No 1035/2011 by updating references to the Annexes to the Chicago Convention / European Commission / 2014-05-02
[R20]	Commission Implementing Regulation (EU) No 1034/2011 of 17 October 2011 on safety oversight in air traffic management and air navigation services and amending Regulation (EU) No 691/2010 / European Commission / 2011-10-17
[R21]	Commission Implementing Regulation (EU) 2016/1377 of 4 August 2016 laying down common requirements for service providers and the oversight in air traffic management/air navigation services and other air traffic management network functions, repealing Regulation (EC) No 482/2008, Implementing Regulations (EU) No 1034/2011 and (EU) No 1035/2011 and amending Regulation (EU) No 677/2011 / European Commission / 2016-08-04

Ref.	Document
[R22]	Commission Implementing Regulation (EU) No 923/2012 of 26 September 2012 laying down the common rules of the air and operational provisions regarding services and procedures in air navigation and amending Implementing Regulation (EU) No 1035/2011 and Regulations (EC) No 1265/2007, (EC) No 1794/2006, (EC) No 730/2006, (EC) No 1033/2006 and (EU) No 255/2010 / European Commission / 2012-09-26
[R23]	Commission Implementing Regulation (EU) 2016/1185 of 20 July 2016 amending Implementing Regulation (EU) No 923/2012 as regards the update and completion of the common rules of the air and operational provisions regarding services and procedures in air navigation (SERA Part C) and repealing Regulation (EC) No 730/2006 / European Commission / 2016-07-20
[R24]	Commission Regulation (EU) 2015/340 of 20 February 2015 laying down technical requirements and administrative procedures relating to air traffic controllers' licences and certificates pursuant to Regulation (EC) No 216/2008 of the European Parliament and of the Council, amending Commission Implementing Regulation (EU) No 923/2012 and repealing Commission Regulation (EU) No 805/2011 / European Commission / 2015-02-20
[R25]	Commission Regulation (EU) No 73/2010 of 26 January 2010 laying down requirements on the quality of aeronautical data and aeronautical information for the single European sky / European Commission / 2010-01-26
[R26]	Commission Implementing Regulation (EU) No 1029/2014 of 26 September 2014 amending Regulation (EU) No 73/2010 laying down requirements on the quality of aeronautical data and aeronautical information for the single European sky / European Commission / 2014-09-26
[R27]	Commission Regulation (EU) No 139/2014 of 12 February 2014 laying down requirements and administrative procedures related to aerodromes pursuant to Regulation (EC) No 216/2008 of the European Parliament and of the Council / European Commission / 2014-02-12

4.3.2 EASA Documents

Ref.	Document
[R28]	Decision 2013/013/R of the Executive Director of the European Aviation Safety Agency of 17 July 2013 adopting the Acceptable Means of Compliance and Guidance Material to Commission Implementing Regulation (EU) No 923/2012 of 26 September 2012 laying down the common rules of the air and operational provisions regarding services and procedures in air navigation and amending Implementing Regulation (EU) No 1035/2011 and Regulations (EC) No 1265/2007, (EC) No 1794/2006, (EC) No 730/2006, (EC) No 1033/2006 and (EU) No 255/20101 'Acceptable Means of Compliance and Guidance Material to the rules of the air' / EASA / 2013-07-13
[R29]	Decision 2016/023/R of the Executive Director of the European Aviation Safety Agency of 13 October 2016 amending the Acceptable Means of Compliance and Guidance Material to Commission Implementing Regulation (EU) No 923/2012 / EASA / 2016-10-13
[R30]	NPA 2016-09(A) - Requirements for air traffic services / EASA / 2016-09-14
[R31]	NPA 2016-09(B) - Requirements for air traffic services / EASA / 2016-09-14
[R32]	Decision 2015/010/R of the Executive Director of the European Aviation Safety Agency of 13 March 2015 adopting Acceptable Means of Compliance and Guidance Material to Commission Regulation (EU) 2015/340 / EASA / 2015-03-13

4.3.3 ICAO Documents

Ref.	Document
[R33]	ICAO Circular 211 - AN / 128 Aerodrome Flight Information Service (AFIS) / ICAO / 1988
[R34]	ICAO DOC 9377 – Manual on Coordination between Air Traffic Services, Aeronautical Information Services and Aeronautical Meteorological Services / ICAO / 2008-10-24
[R35]	ICAO DOC 9426 – Air Traffic Services Planning Manual / ICAO / 1992-12-30

Ref.	Document
[R36]	ICAO EUR RNP APCH Guidance Material (EUR Doc 025)/ - / First Edition / European and North Atlantic Office of ICAO / December 2012

Relevant ICAO Annexes are not included again as the Czech Aviation regulations (transposed annexes) reflect the most current version of the ICAO Annexes. Transposition of ICAO updates into Czech regulation is done immediately as soon as ICAO publishes the changes.

4.3.4 EUROCONTROL Documents

Ref.	Document
[R37]	EUROCONTROL Manual for Aerodrome Flight Information Service (AFIS) version 1.0 / EUROCONTROL / 2010-06-17

4.4 Identification of Specific IFR Regulative Requirements

The project-related IFR regulative requirements will be identified in this chapter. Consequences of the IFR regulative requirements identified will be analysed during the elaboration of CONOPS. The project-related IFR regulative requirements are divided into three areas:

1. IFR regulative requirements identified in the EU legislation in force.
2. IFR regulative requirements identified in [R21] Commission Implementing Regulation (EU) 2016/1377.
3. IFR regulative requirements identified in [R30] NPA 2016-09(A) and [R31] NPA 2016-09(B).

4.4.1 IFR regulative requirements identified in the EU legislation in force

I. [R09] Regulation (EC) No 550/2004 as amended by [R10] Regulation (EC) No 1070/2009.

No IFR regulative requirements identified.

II. [R11] Regulation (EC) No 216/2008 as amended by [R12] Regulation (EC) No 1108/2009.

Initially [R11] did not contain any IFR regulative requirements. Amendment [R12] introduced requirements to aerodromes, including equipment, open to public use and which serve commercial air transport and where operations using instrument approach or departure procedures are provided, and have a paved runway of 800 metres or above; or exclusively serve helicopters. However member state may decide to exempt an aerodrome which handles no more than 10000 passengers; and 850 movements related to cargo operations per year. The requirements identified are in Annex B: CZCAA IFR study specific IFR regulatory requirements / Reg 216-2008 consolidated.

III. [R13] Commission Regulation (EC) No 1033/2006 as amended by [R22] Commission Implementing Regulation (EU) No 923/2012, [R14] Commission Implementing Regulation (EU) No 428/2013 and [R15] Commission Implementing Regulation (EU) 2016/2120.

[R13] is also applicable to ATS units providing services to general air traffic flying in accordance with instrument flight rules. As ATS can also be ATC or AFIS this regulation is applicable to them. The requirements identified are in Annex B: CZCAA IFR study specific IFR regulatory requirements / Reg 1033-2006 consolidated.

IV. [R16] Commission Regulation (EU) No 255/2010 as amended by [R22] Commission Implementing Regulation (EU) No 923/2012 and [R17] Commission Implementing Regulation (EU) 2016/1006.

[R16] is applicable to all flights intended to operate or operating as general air traffic and in accordance with the instrument flight rules in whole or in part. [R16] is also applicable to ATS units (ATC or AFIS) this regulation is also applicable to them. The requirements identified are in Annex B: CZCAA IFR study specific IFR regulatory requirements / Reg 255-2010 consolidated.

V. [R18] Commission Implementing Regulation (EU) No 1035/2011 as amended by [R22] Commission Implementing Regulation (EU) No 923/2012 and [R19] Commission Implementing Regulation (EU) No 448/2014.

No IFR regulative requirements identified.

VI. [R20] Commission Implementing Regulation (EU) No 1034/2011.

No IFR regulative requirements identified.

VII. [R22] Commission Implementing Regulation (EU) No 923/2012 as amended by [R24] Commission Regulation (EU) 2015/340 and [R23] Commission Implementing Regulation (EU) 2016/1185.

[R22] is applicable to the competent authorities of the member states, air navigation service providers, aerodrome operators and ground personnel engaged in aircraft operations. It also contains rules applicable to all IFR flights. The requirements identified are in Annex B: CZCAA IFR study specific IFR regulatory requirements / Reg 923-2012 consolidated.

VIII. [R24] Commission Regulation (EU) 2015/340.

No IFR regulative requirements identified.

IX. [R25] Commission Regulation (EU) No 73/2010 as amended by [R26] Commission Implementing Regulation (EU) No 1029/2014.

[R25] This regulation is also applicable to operators of those aerodromes and heliports, for which IFR procedures have been published in national aeronautical information publications. The requirements identified are in Annex B: CZCAA IFR study specific IFR regulatory requirements / Reg 73-2010 consolidated.

X. [R27] Commission Regulation (EU) No 139/2014.

If no exemption is provided by the member state (see 4.4.1/II.), the aerodrome operator where operations using instrument approach or departure procedures are provided has to fulfil requirements of this regulation [R27]. The requirements identified are in Annex B: CZCAA IFR study specific IFR regulatory requirements / Reg 139-2014.

4.4.2 IFR regulative requirements identified in [R21]

No IFR regulative requirements identified.

4.4.3 IFR regulative requirements identified in [R30] and [R31]

As these NPAs contain update proposals to [R21] Commission Implementing Regulation (EU) 2016/1377 [R22] Commission Implementing Regulation (EU) No 923/2012 the IFR regulative requirements will be identified as soon as the IFR regulative requirements of [R21] and [R22] are confirmed.

Annex A: Aerodrome charts

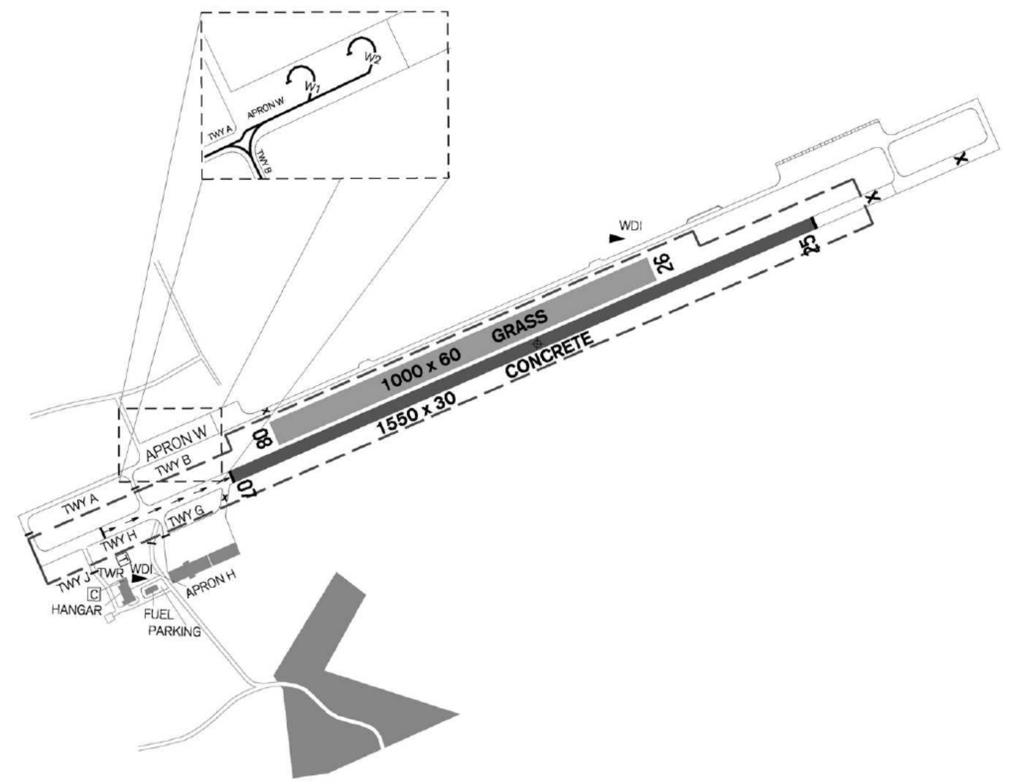
Mnichovo Hradiště Airport (LKMH-CR)

VFR-AD-LKMH-ADC   Mnichovo Hradiště   21 JUL 16 (2)

LKMH Mnichovo Hradiště

Hradiště RADIO
120,400

RWY	Magnetic direction	RWY dimensions	Strength	TORA	TODA	ASDA	LDA
07	065°	1550 x 30	PCN 25/R/A/Y/T	1970	2030	1970	1550
25	245°	1550 x 30	PCN 25/R/A/Y/T	1550	1970	1970	1550
08	065°	1000 x 60	800 kg / 0.4 MPa	1000	1200	1000	1000
26	245°	1000 x 60	800 kg / 0.4 MPa	1000	1060	1000	1000



Aero-taxi OKR, a.s.
Tanvaldská 345, 463 11 Liberec 30,
☎/🖷 +420 485 105 040

letiště Letiště, 295 01 Mnichovo Hradiště,
☎/🖷 +420 326 721 973, ☎ +420 603 197 336, EN
Providing information to known traffic
☎ +420 326 721 973, ☎ +420 603 197 336,
http://www.lkmh.cz, info@aero-taxi.cz

Customs and immigration clearance: MON - FRI O/R (letter, fax) 24 HR in advance, otherwise O/R (letter, fax) 48 HR in advance

TWYs C, D, E, F and apron N are closed for aeronautical operation.

On the paved RWY operations of aircraft up to code marking 2B with MTOW not exceeding 25 t are permitted.

0700-1500 otherwise O/R

aviation petrol: AVGAS 100LL, aviation kerosene JET-A1 O/R

O/R - Aeroshell 15-W-50, ELF 100

O/R, limited

O/R, limited

hotels and boarding-houses in Mnichovo Hradiště

NIL

bus, train, taxi, official car O/R

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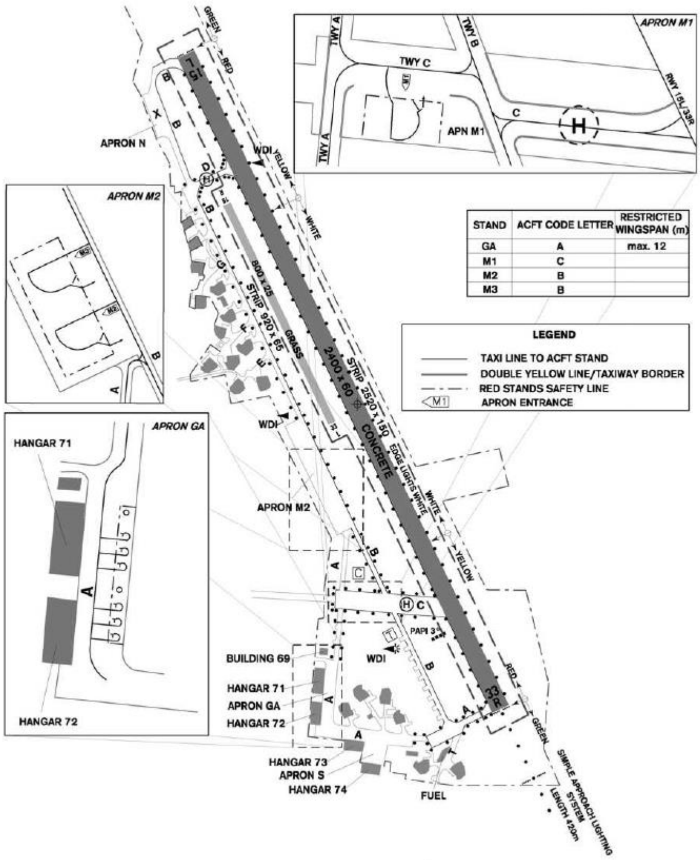
Hradec Králové Airport (LKHK-CR)

VFR-AD-LKHK-ADC | Hradec Králové | 18 AUG 16 (1)

LKHK Hradec Králové

Kral INFO
122,000

RWY	Magnetic direction	RWY dimensions	Strength	TORA	TODA	ASDA	LDA
33L	331°	800 x 25	5700 kg / 0.7 MPa	800	830	800	800
15R	151°	800 x 25	5700 kg / 0.7 MPa	800	830	800	800
33R	331°	2400 x 60	PCN 33/R/B/X/T	2400	2460	2400	2400
15L	151°	2400 x 60	PCN 33/R/B/X/T	2400	2460	2400	2400



MON - SUN 0700-TE (0600-TE)
except 24-26 DEC, 1 JAN; otherwise O/R

AVGAS 100LL - during operational hours;
JET A1 - during operational hours

TOTAL 15W-50, SHELL 15W-50, EXXON 20W-50
MON-FRI 0700-1500 (0600-1400)

O/R

O/R - by contract with Hradecká Letecká Servisní, s.r.o. with DSA a. s.
For types of aircrafts see article 2.5.

O/R 24 HR

limited at the AD, city Hradec Králové

public transport - number 15 and 25

Letecké služby Hradec Králové, a.s.
Piletická 151, 500 03 Hradec Králové 3 - Rusek,
☎ +420 491 619 011, 🖷 +420 491 617 699,
info@lshk.cz, office@lshk.cz, handling@lshk.cz

AFIS ☎ +420 491 617 687, ☎ +420 733 603 191
Handling ☎ +420 731 658 193
Ing. Pavel Rind ☎ +420 733 603 168, EN
Ing. Tomáš Kvítek ☎ +420 733 546 039, EN
Ing. Jan Vaněček ☎ +420 733 546 007, EN

Customs and immigration clearance: O/R minimally 24 hours in advance. Visas are not granted.

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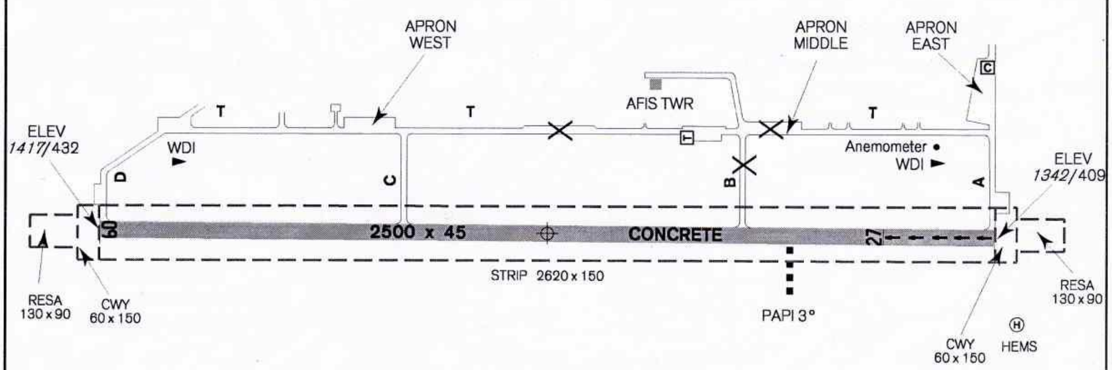
České Budějovice Airport (LKCS-CR)

VFR-AD-LKCS-ADC České Budějovice 23 JUN 16 (2)

LKCS České Budějovice

Budějovice INFO
135,925

RWY	Magnetický směr	Rozměry RWY	Únosnost	TORA	TODA	ASDA	LDA
27	270°	2500 x 45	PCN 32/R/B/W/T	2500	2560	2500	2200
09	090°	2500 x 45	PCN 32/R/B/W/T	2500	2560	2500	2500



Jihočeské letiště České Budějovice, a.s.
U Zimního stadionu 1952/2, 370 76 České Budějovice, ☎/🖷 +420 387 201 931,
☎/🖷 +420 387 201 014, airport@airport-cb.cz,
http://www.airport-cb.cz

AFIS ☎ +420 386 325 339, ☎ +420 725 036 721,
🖷 +420 387 201 014, twr@airport-cb.cz
Ing. Ladislav Ondřich ☎ +420 387 201 931,
airport@airport-cb.cz
Ing. Robert Kala ☎ +420 387 204 543

Celní a pasové odbavení: O/R 24H předem MON - FRI
O/R 48H předem SAT, SUN, HOL

THR RWY 27 trvale posunut o 300m na západ.

APN M uzavřena, TWY B uzavřena, část TWY T uzavřena (od TWY C po APN M).

MON-SUN 0600 (0500) - TE,
jinak O/R 24HR předem

AVGAS 100LL, JET-A1

NIL

omezeně

omezeně

hotely České Budějovice

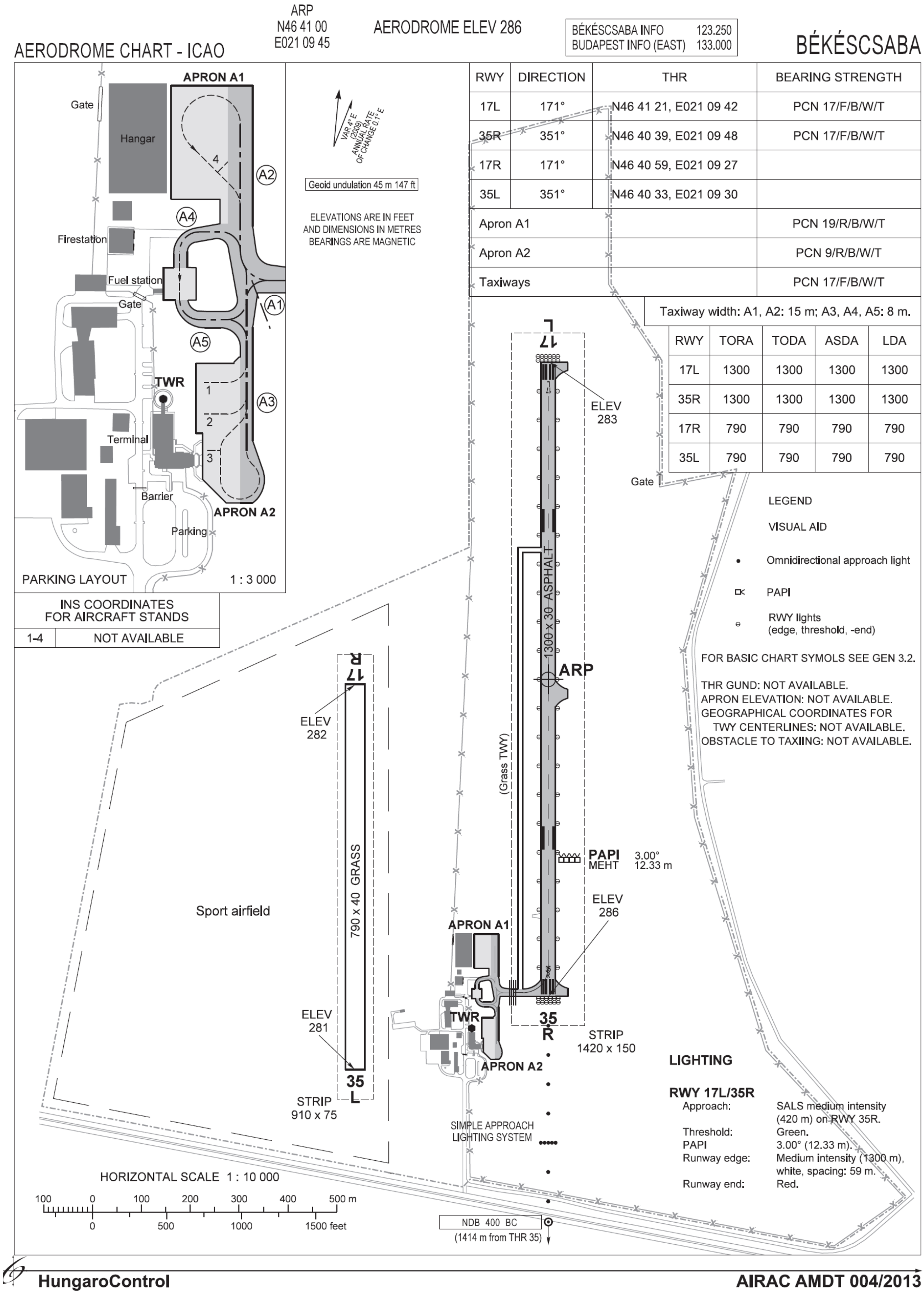
obce Planá, Litvínovice, České Budějovice

městská hromadná doprava, linka č. 19

Řízení letového provozu České republiky

VFR příručka - Česká republika

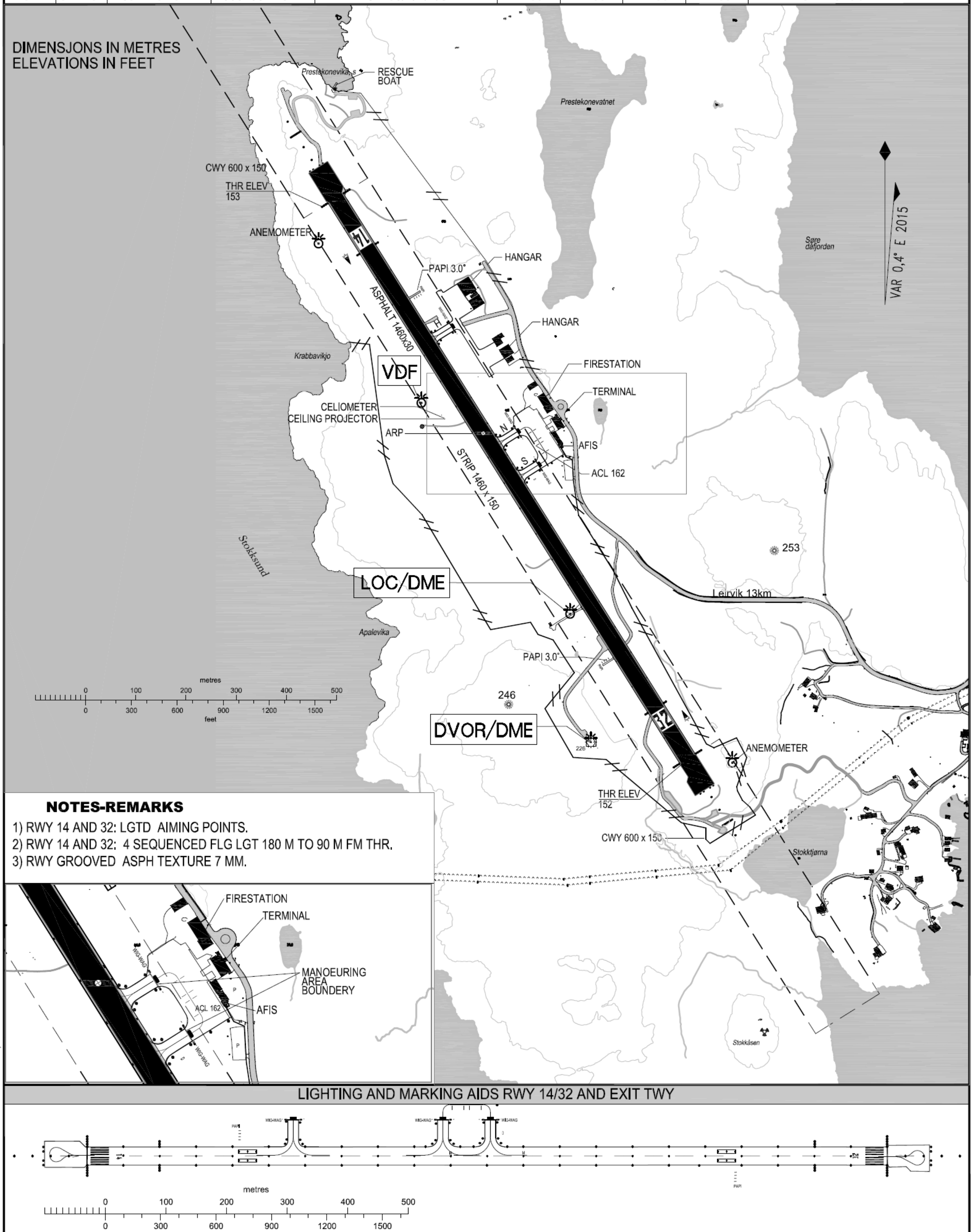
Békéscsaba Repülőtér Airport (LHBC-HU)



Stord Sørstokken Airport (ENSO-NO)

AERODROME CHART	59°47'34"N 005°20'23"E WGS 84	AD ELEV 161 FT	AFIS 120.200 MHZ	STORD SØRSTOKKEN NORWAY

RWY	BRG (GEO)	THRESHOLD		BEARING STRENGTH	DECLARED DISTANCES				TWY AND APRON
					TORA	ASDA	TODA	LDA	TAXIWAYS, 17,5M WIDE
14	144.78°	594748.37 N	0052002.64 E	PCN-35/F/B/X/U	1199	1199	1799	1199	ASPH PCN 35/F/B/X/U
32	324.79°	594713.49 N	0052051.48 E	PCN-35/F/B/X/U	1199	1199	1799	1199	APRON 45x96

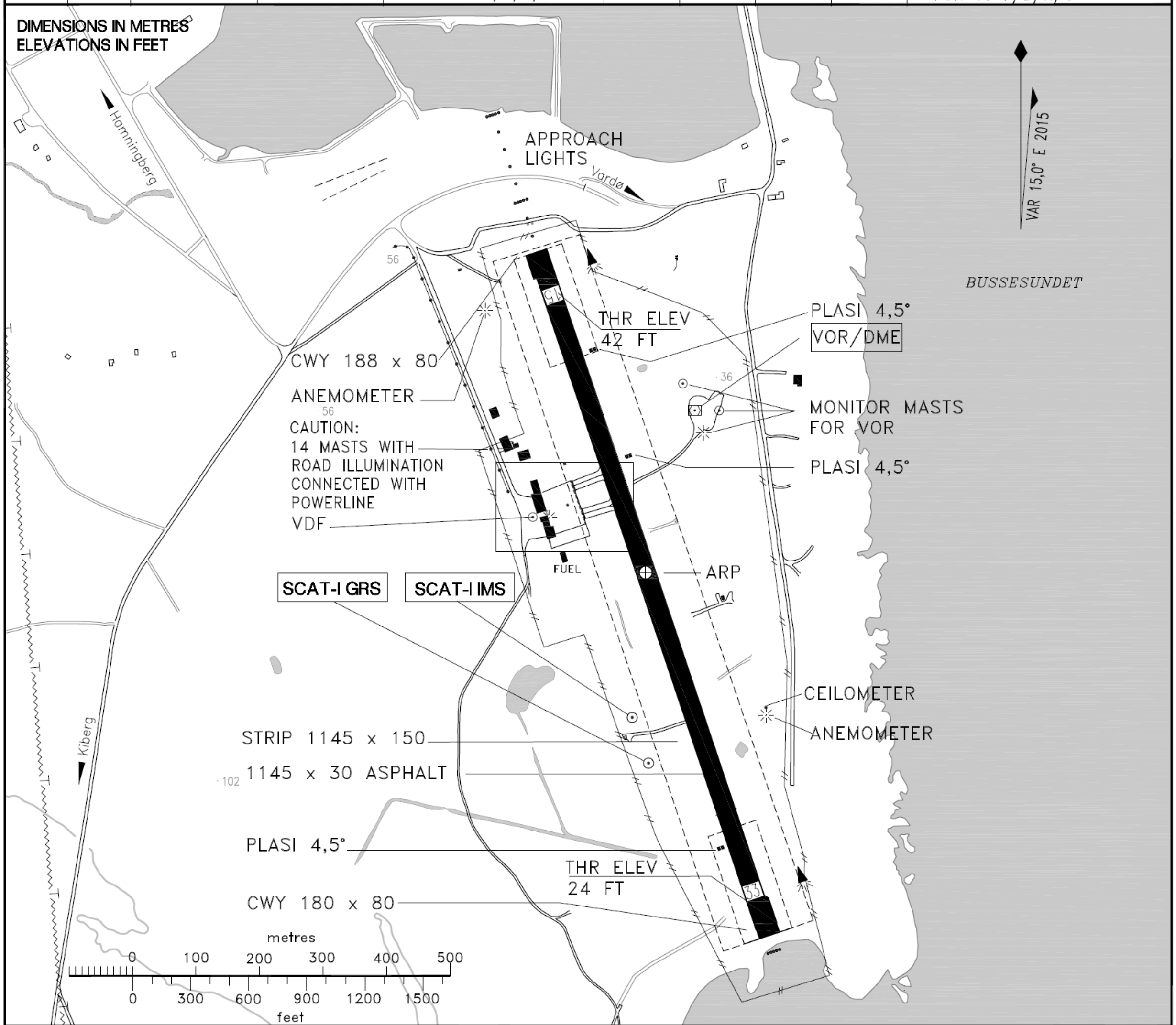


RWY	APCH	THR	PAPI	RWY CL	EDGE	END	RWY	APCH	THR	PAPI	RWY CL	EDGE	END
14	W CL/XBAR LIH	G LIH	3.0° MEHT 42FT	1199M/60M W	800M W/400M Y LIH	R LIH	32	W CL/XBAR LIH	G LIH	3.0° MEHT 44FT	1199M/60M W	800M W/400M Y LIH	R LIH

Vardø Svartnes Airport (ENSS-NO)

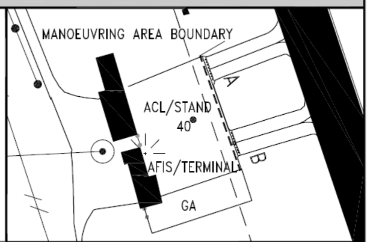
AERODROME CHART	70°21'19"N 031°02'42"E WGS 84	AD ELEV 42 FT	AFIS 122.150 MHz	VARDØ SVARTNES NORWAY

RWY	BRG (GEO)	THRESHOLD		BEARING STRENGTH	DECLARED DISTANCES				TWY AND APRON
					TORA	ASDA	TODA	LDA	APRON 70 x 50
15	163.28°	702134.18N	0310228.42E	PCN-15 F/B/X/U	965	965	1145	905	TWY 15M WIDE
33	343.28°	702102.49N	0310256.71E	PCN-15 F/B/X/U	965	965	1153	905	PCN 15 F/B/X/U

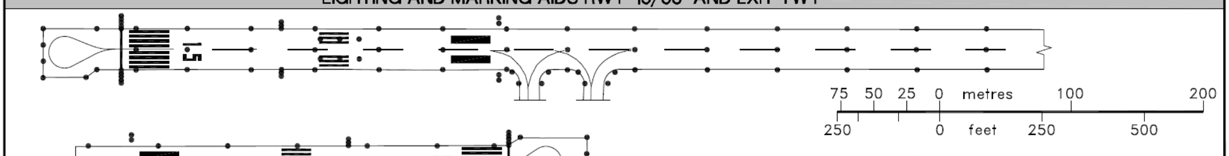


NOTES-REMARKS

1) XBAR AT 144M AND 288M FM THR.
   FLASHING W LGT 288M FM THR.
2) XBAR AT 86M FM THR.
   FLASHING W LGT 86M FM THR.
3) SCREENHEIGHT 40 FT.
4) SCREENHEIGHT 43 FT.

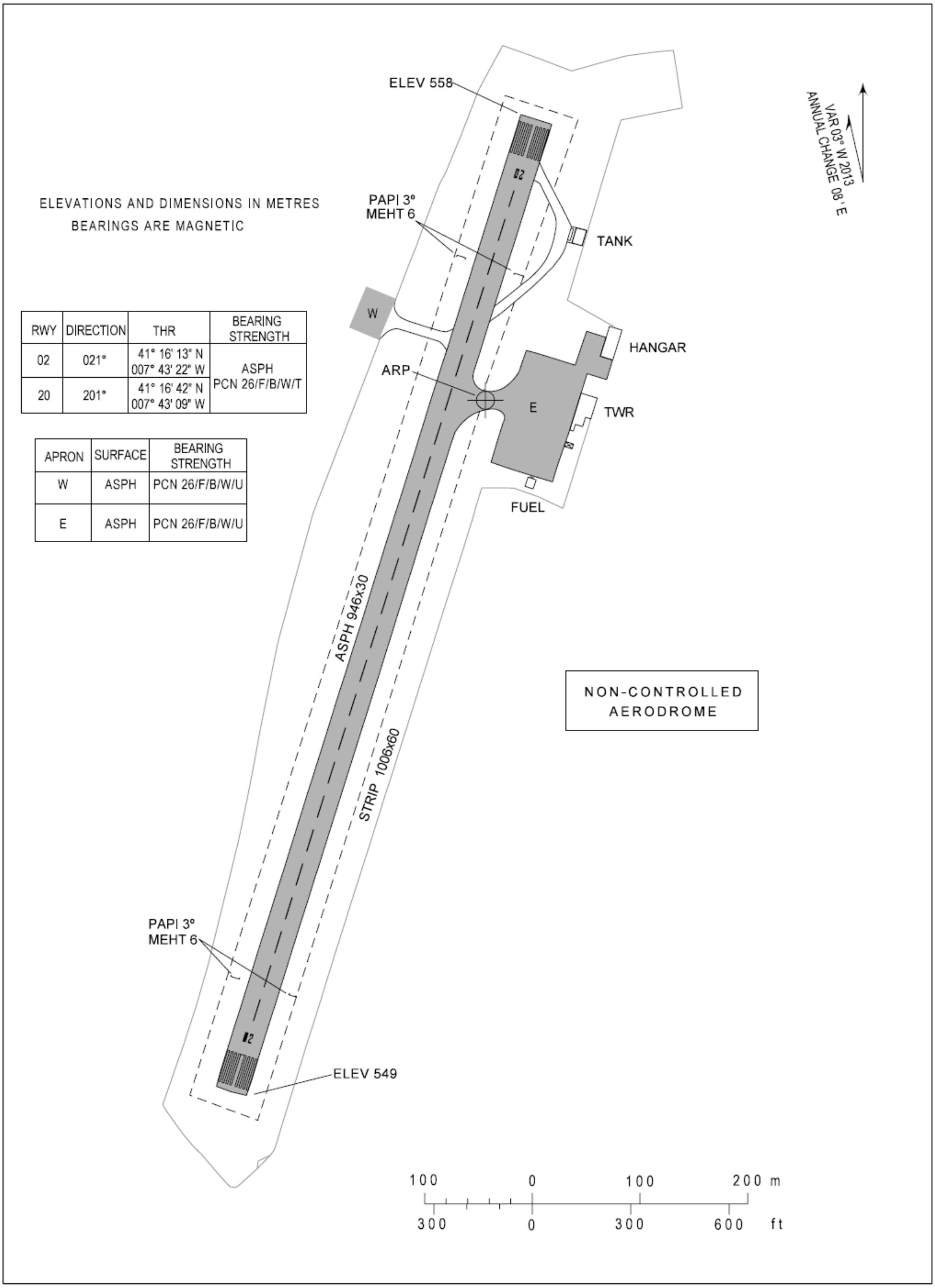


LIGHTING AND MARKING AIDS RWY 15/33 AND EXIT TWY

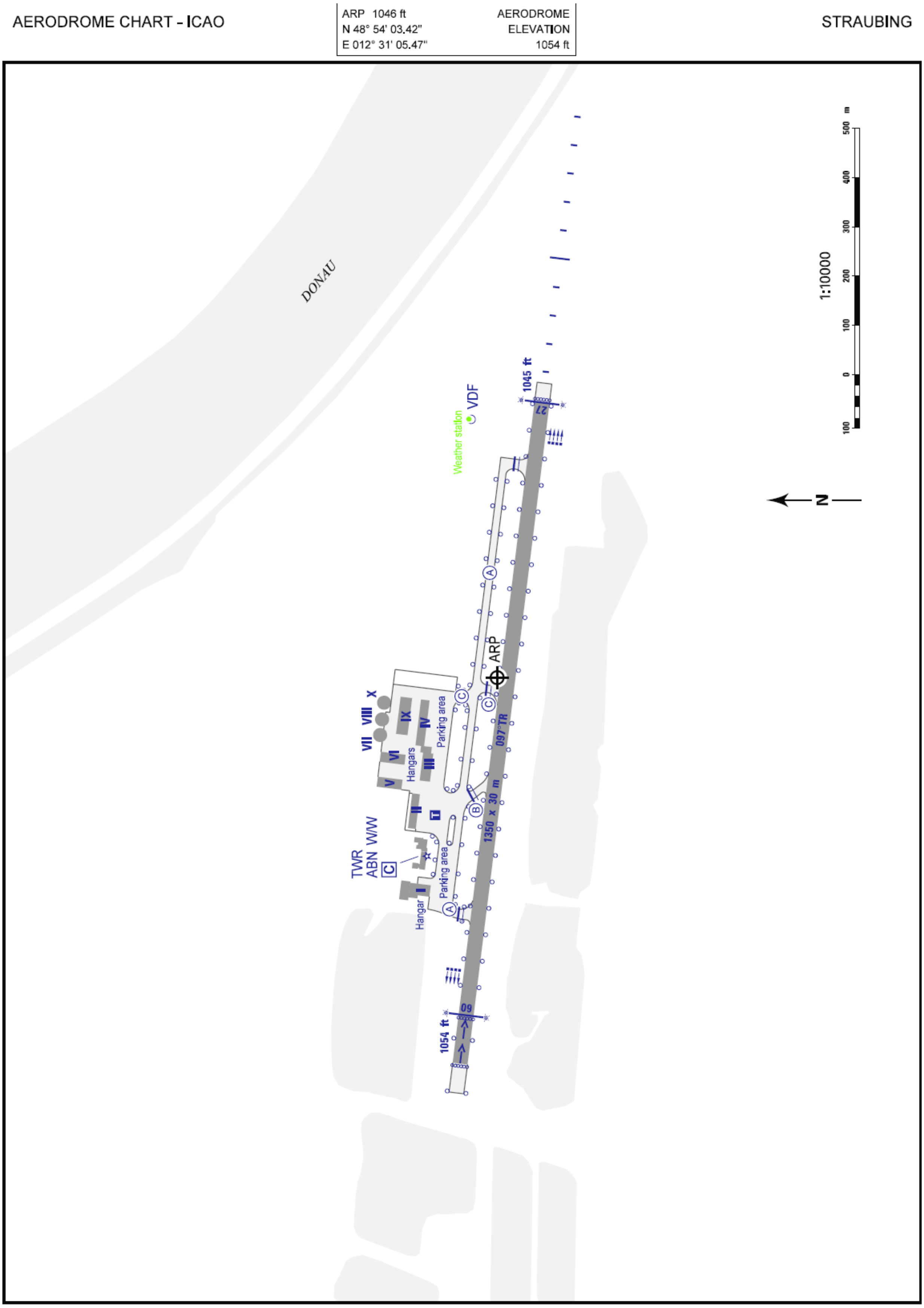


RWY	APCH	THR	PLASI	RWY CL	EDGE	END
15	W CL/XBAR LIL/H 1)	G LIH	4.5° MEHT 23FT 3)	1025M W LIL	601M W/303M Y LIH	R LIH
35	W CL/XBAR LIH 2)	G LIH	4.5° MEHT 24FT 4)	1025M W LIL	637M W/388M Y LIH	R LIH

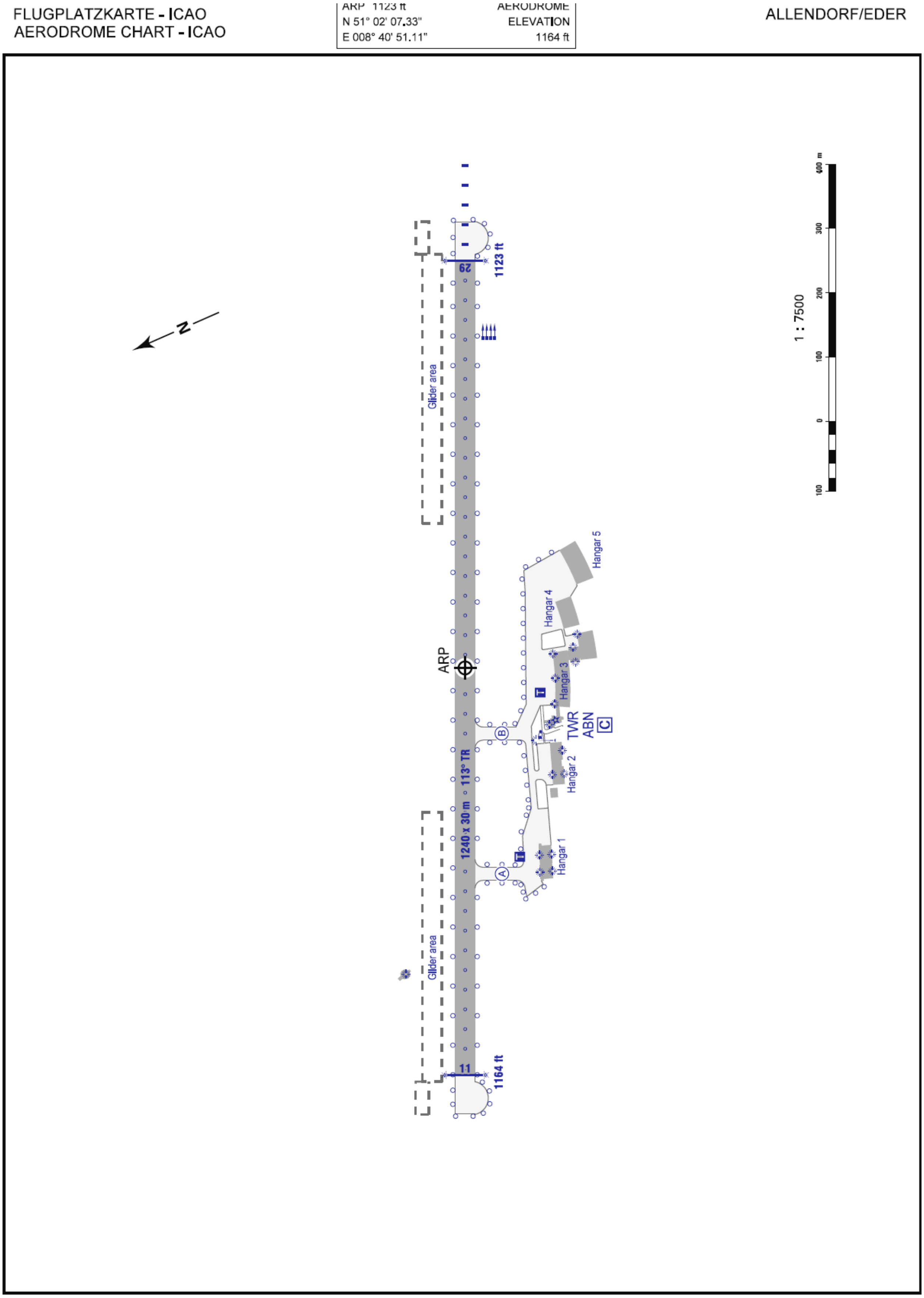
Vila Real Airport (LPVR-PO)



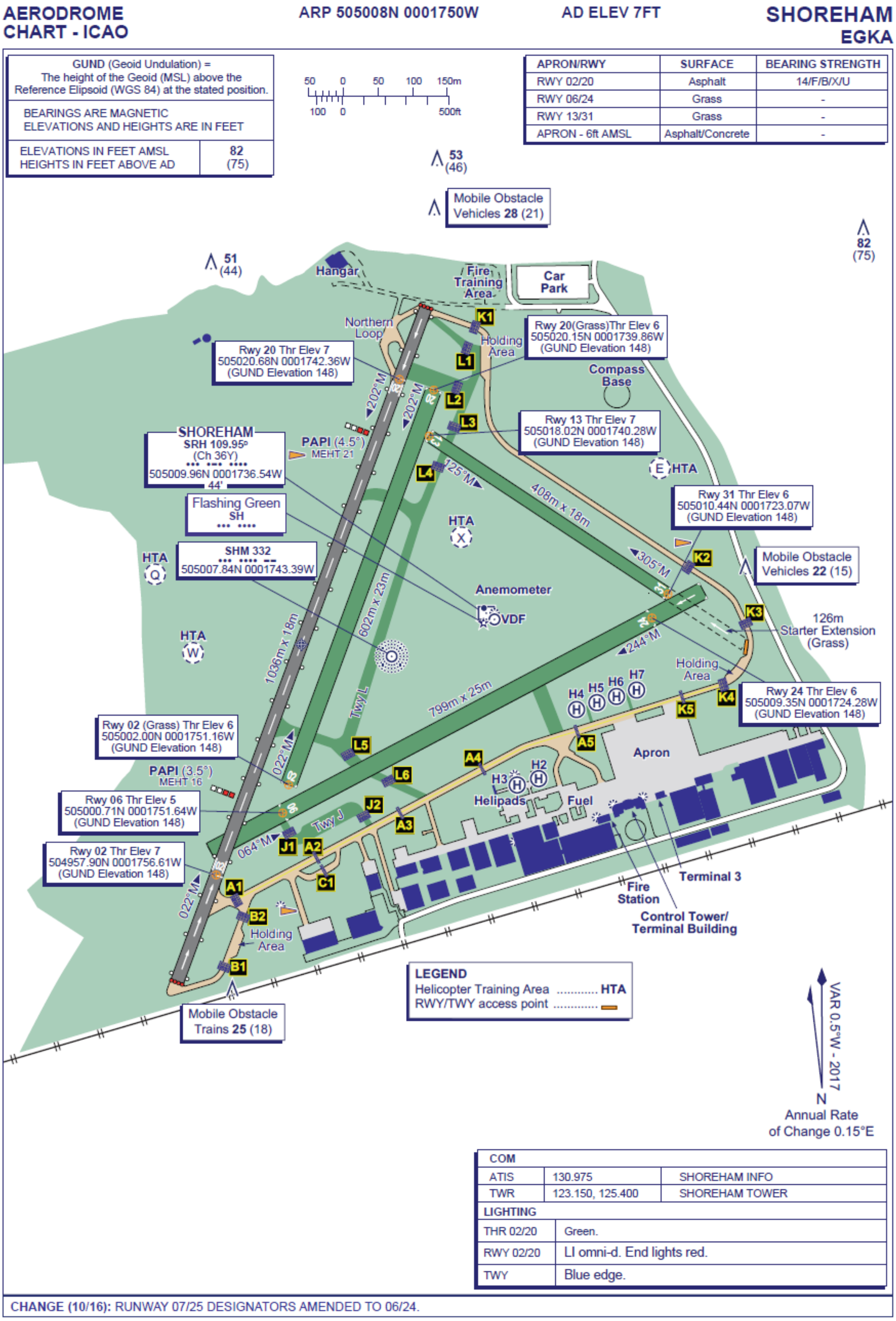
Straubing Wallmühle Airport (EDMS-DE)



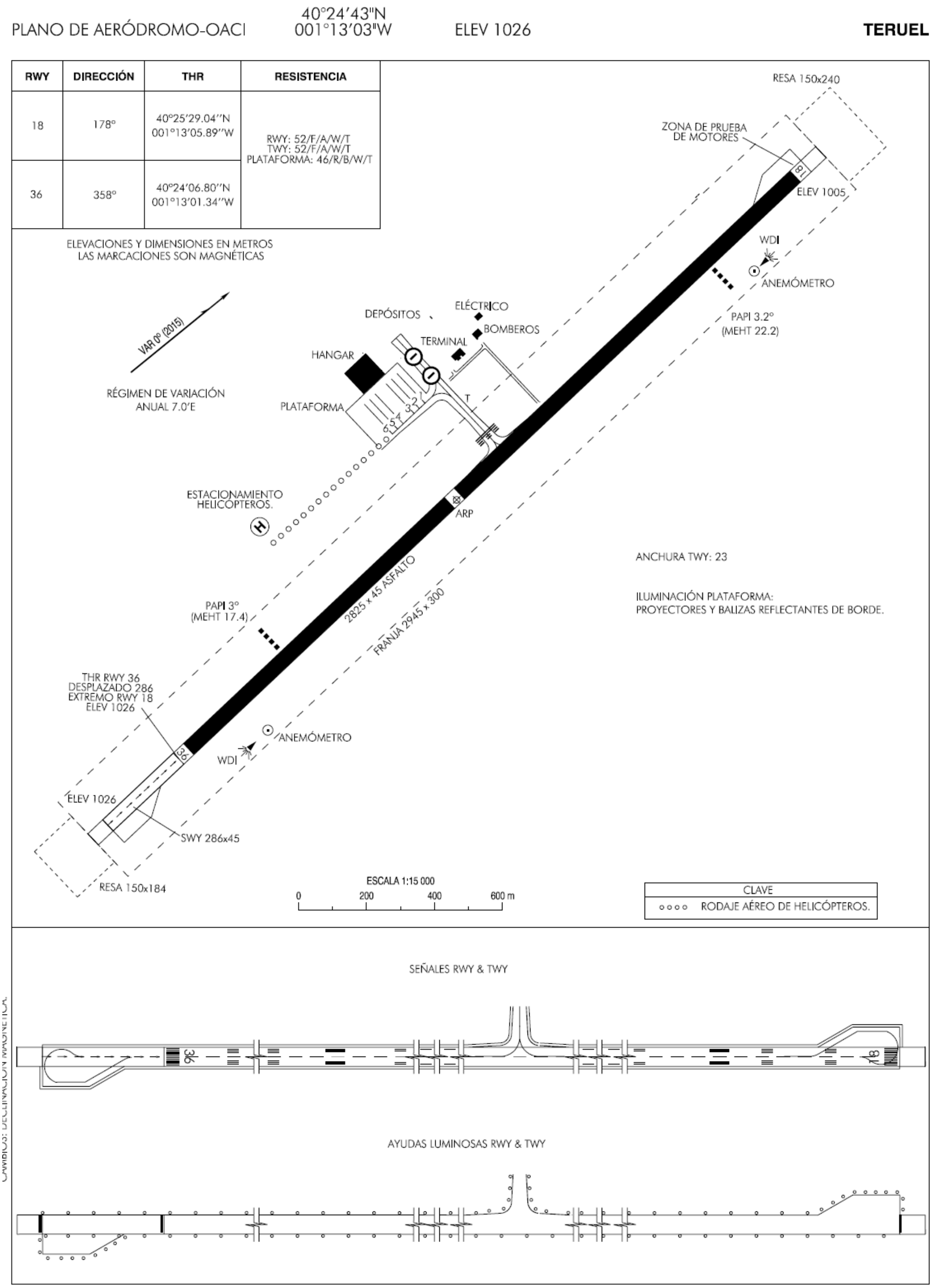
Allendorf Eder Airport (EDFQ-DE)



Brighton City/Shoreham Airport (EGKA-UK)



Teruel Airport (LETL-ES)



Annex B: CZCAA IFR study specific IFR regulatory requirements

Filename: CZCAA IFR study 00032 02.00 Released IFR reg requirements.xls