Civil Aviation (Aeronautical Information Services and Charts) (Amendment) Regulations, 2023 (No. 1)

IT is hereby notified that the Minister of Transport and Infrastructural Development has, in terms of section 79 of the Civil Aviation Act [*Chapter 13:16*], made the following regulations:—

1. These regulations may be cited as the Civil Aviation (Aeronautical Information Services and Charts) (Amendment) Regulations, 2023 (No. 1).

2. Section 11 of the Civil Aviation (Aeronautical Information Services and Charts) Regulations, 2019, published in Statutory Instrument 16 of 2019 ("hereinafter called the principal regulations" is amended in subsection (1) by the insertion of paragraph (c) as follows—

"(c) ensure that aeronautical data related to charting integrity show compliance with data quality requirements and standards as set in the Appendix 6 in the Fourth Schedule.".

3. The principal regulations are amended in the Fourth Schedule by insertion of Appendix 6 after Appendix 5 as follows—

"APPENDIX 6

AERONAUTICAL DATA CATALOGUE

TABLE S1—1 Aerodrome/Heliport Data

Subject	Property	Sub property	Type	Description	Note	Accuracy	Integrity	Origin Type	Pub Resolution	Chart Resolution
Aerodrome/ Heliport	Field Elevation	Elevation	Elevation	The vertical distance above Mean Sea Level (MSL) of the highest point of the landing area.		0.5 m	essential	surveyed	1m or 1 ft	1 m or 1 ft
		Geoid undulation	Height	Geoid undulation at the aerodrome/ heliport elevation position	where appropriate	0.5 m	essential	surveyed	1 m or 1 ft	1 m or 1 ft
	Reference temperature		Value	The monthly mean of the daily maximum temperatures for the hottest month of the year at an aerodrome. This temperature should be averaged over a period of years.						
	Mean low temperature		Value	The mean lowest temperature of the coldest month of the year, for the last five years of data at the aerodrome elevation.		5 degrees				
	Magnetic Variation	Angle	Angle	The magnetic variation angle value		1 degree	essential	surveyed	1 degree	1 degree
	Reference point	Position	Point	Geographical location of aerodrome reference point.		30 m	routine	surveyed/ calculated	1 sec	1 sec
Runway	Nominal length		Distance	The declared longitudinal extent of the runway for operational (performance) calculations.		1 m	critical	surveyed	1 m or 1 ft	1 m
	Nominal width		Distance	The declared transversal extent of the runway for operational (performance) calculations.		1 m	essential	surveyed	1 m or 1 ft	1 m
		Position	Point	The geographical location of runway centre Line at each end of the runway, at the stopway and at the origin of each take-off flight path area, and at each significant change in slope of runway and stop way		1 m	critical	surveyed		
		Elevation	Elevation	The elevation of the corresponding centre line point. Any significant high and low intermediate points along the runway shall be measured to the accuracy of one-half metre or foot.		0.25 m	critical	surveyed		
		Geoid undulation	Height	The geoid undulation at the corresponding center line point						
	Runway exit line	Exit guidance line	Line	The geographical location of the runway exit line		0.5 m	essential	surveyed	1/100 sec	1 sec
	Shoulder	Width	Distance	The width of the runway shoulder		1m	essential	surveyed	1 m or 1 ft	
Runway Direction	True bearing		Bearing	The true bearing of the runway.		1/100 deg	Routine	surveyed	1/100 degree	1 degree
	Threshold	Position	Point	Geographical location for runway threshold		1 m	critical	surveyed	1/100 sec	1 sec

		Elevation	Elevation of the runway threshold	Threshold elevation for runways with non-precision approaches		0.5 m	essential	surveyed	1 m or 1 ft	1 m or 1 ft
		Elevation	Elevation of the runway threshold	Threshold elevation for runways with precision approaches		0.25 m	critical	surveyed	0.1 m or 0.1 ft	0.5 m or 1 ft
		Geoid undulation	Height	WGS-84 geoid undulation at runway threshold, non-precision approaches		0.5 m	essential	surveyed	1 m or 1 ft	1 m or 1 ft
		Geoid undulation	Height	WGS-84 geoid undulation at runway threshold, precision approaches		0.25 m	critical	surveyed	0.1 m or 0.1 ft	0.5 m or 1 ft
		Displacement	Distance	Distance of displaced threshold	If displaced threshold	1 m	routine	surveyed	1m or 1ft	
	Runway End	Position	Point	Location of the runway end in the direction of departure		1 m	critical	surveyed	1/100 sec	1 sec
		Elevation	Elevation	Elevation of the runway end and any significant high and low intermediate points along the runway for non-precision approaches		0.5 m or 1 ft				
		Elevation	Elevation	Elevation of the runway end and the highest elevation of the touchdown zone for precision approach runways		0.25 m or 1 ft				
	Touch Down Zone	Elevation	Elevation	Highest elevation of the touchdown zone of a precision approach runway	precision approach RWY	0.25 m or 1 ft				
	Stop way	Length	Distance	The longitudinal extent of stopway	if any	1 m	critical	surveyed	1 m or 1 ft	1 m
		Width	Distance	Width of the stop way		1 m	critical	surveyed	1 m or 1 ft	1 m
	Clearway	Length	Distance	The longitudinal extent of the clearway		1 m	essential	surveyed	1 m or 1 ft	
		Width	Distance	The transversal extent of the clearway		1 m	essential	surveyed	1 m or 1 ft	
		Ground profile		The vertical profile (or slope) of the clearway						
	Declared Distances	TORA	Distance	Take-off run available - The length of runway declared available and suitable for the ground run of an aeroplane taking off.		1 m	critical	surveyed	1 m or 1 ft	1 m
		TODA	Distance	Take-off distance available - The length of the take-off run available plus the length of the clearway, if provided.		1 m	critical	surveyed	1 m or 1 ft	1 m
		ASDA	Distance	Accelerate-stop distance available - The length of the take-off run available plus the length of the stopway, if provided.		1 m	critical	surveyed	1 m or 1 ft	1 m
		LDA	Distance	Landing distance available - The length of runway which is declared available and suitable for the ground run of an aeroplane landing.		1 m	critical	surveyed	1 m or 1 ft	1 m
Final Approach and Take off area (FATO)	Threshold	Position	Point	Geographical location of FATO threshold		1m	critical	surveyed	1/100 sec	1 sec
		Elevation	Elevation	FATO threshold, for heliports with or without a PinS approach		0.5m	essential	surveyed	1 m or 1 ft	FATO threshold, for heliports with or without a PinS approach
				FATO threshold, for heliports intended to be operated in accordance with ICAO Annex 14, Appendix 2		0.25m	critical	surveyed	1 m or 1 ft (non-precision) 0.1 m or 0.1 ft (precision)	FATO threshold, for heliports intended to be operated in accordance with ICAO Annex 14, Appendix 2
		Geoid undulation	Height	WGS–84 geoid undulation at FATO threshold, TLOF geometric centre, for heliports with or without a PinS approach		0.5m	essential	surveyed	1 m or 1 ft	WGS–84 geoid undulation at FATO threshold, TLOF geometric centre, for heliports with or without a PinS approach

				WGS–84 geoid undulation at FATO threshold, TLOF geometric centre, for heliports intended to be operated in accordance with ICAO Annex 14, Appendix 2		0.25m	critical	surveyed	1 m or 1 ft (non-precision) 0.1 m or 0.1 ft (precision)	WGS–84 geoid undulation at FATO threshold, TLOF geometric centre, for heliports intended to be operated in accordance with ICAO Annex 14, Appendix 2
	Departure end of a runway	Position	Point	Geographical location of DER		1m	critical	surveyed	1/100 sec	
		Elevation	Elevation	The elevation of the DER is the higher of the elevations of the beginning and end of the runway/FATO.						
	Length		Distance	The longitudinal extent of FATO		1m	critical	surveyed	1 m or 1 ft	1 m
	True Bearing		Bearing	The true bearing of FATO		1/100 deg	routine	surveyed	1/100 degree	
	Declared Distances	TODAH	Distance	Take-off distance available - The length of the FATO plus the length of helicopter clearway (if provided)	and if applicable, alternative reduced declared distances;	1m	critical	surveyed	1 m or 1 ft	
		RTODAH	Distance	Rejected Take-off distance available - The length of the FATO declared available and suitable for helicopters operated in performance class 1 to complete a rejected take-off.		1m	critical	surveyed	1 m or 1 ft	
		LDAH	Distance	Landing distance available - The length of the FATO plus any additional area declared available and suitable for helicopters to complete the landing manoeuvre from a defined height.		1m	critical	surveyed	1 m or 1 ft	
Touchdown and lift-off area	Centre point	Position	Point	Geographical location of TLOF geometric centre		1m	critical	surveyed	1/100 sec	1 sec
		Elevation	Elevation	FATO threshold, for heliports with or without a PinS approach		0.5m	essential	surveyed	1 m or 1 ft	FATO threshold, for heliports with or without a PinS approach
				FATO threshold, for heliports intended to be operated in accordance with ICAO Annex 14, Appendix 2		0.25m	critical	surveyed	1 m or 1 ft (non-precision) 0.1 m or 0.1 ft (precision)	FATO threshold, for heliports intended to be operated in accordance with ICAO Annex 14, Appendix 2
		Geoid undulation	Height	WGS–84 geoid undulation at FATO threshold, TLOF geometric centre, for heliports with or without a PinS approach		0.5m	essential	surveyed	1 m or 1 ft	WGS–84 geoid undulation at FATO threshold, TLOF geometric centre, for heliports with or without a PinS approach
				WGS–84 geoid undulation at FATO threshold, TLOF geometric centre, for heliports intended to be operated in accordance with ICAO Annex 14, Appendix 2		0.25m	critical	surveyed	1 m or 1 ft (non-precision) 0.1 m or 0.1 ft (precision)	WGS–84 geoid undulation at FATO threshold, TLOF geometric centre, for heliports intended to be operated in accordance with ICAO Annex 14, Appendix 2
	Length		Distance	The longitudinal extent of TLOF		1m	critical	surveyed	1 m or 1 ft	1 m
	Width		Distance	The transversal extent of TLOF		1m	critical	surveyed	1 m or 1 ft	1 m
	Bearing strength		Value	The bearing strength of TLOF					1 tone	
Apron	Geometry		Polygon	Geographical location of the apron element		1m	routine	surveyed	1/10 sec	1 sec

Taxiway	Width		Distance	The transversal extent of the taxiway.		1m	essential	surveyed	1 m or 1 ft	
	Centre line points	Position	Point	Geographical coordinates of taxiway center line points		0.5m	essential	surveyed	1/100 sec	1/100 sec
		Elevation	Elevation	Elevation of taxiway center line points		1m	essential	surveyed		
	Shoulder	Width	Distance	The width of the taxiway shoulder		1m	essential	surveyed	1 m or 1 ft	
	Guidance Lines	Geometry	Line	Geographical location of guidance lines		0.5 m	essential	surveyed	1/100 sec	1/100 sec
	Intermediate holding position marking line		Line	Intermediate holding position marking line		0.5 m	essential	surveyed	1/100 sec	1 sec
	Runway holding position	Geometry	Line	Geographical location of runway holding position		0.5m	essential	surveyed	1/100 sec	1 sec
Helicopter ground taxiway	Center line points		Point	Geographical location of helicopter ground center line taxiway points		0.5m	essential	surveyed/ calculated		
	Elevation		Elevation	Elevation of helicopter ground taxiway		1m	essential	surveyed		
	Width		Distance	The transversal extent of the helicopter ground taxiway		1m	essential	surveyed		
	Surface type		Text	The surface type of the helicopter ground taxiway						
	Intersection marking line		Line	Helicopter ground taxiway intersection marking line		0.5 m	essential	surveyed	1/100 sec	1 sec
Helicopter air taxiway	Center line points		Point	Geographical location of helicopter air taxiway center line points		0.5m	essential	surveyed/ calculated		
	Elevation		Elevation	Elevation of helicopter air taxiway		1m	essential	surveyed		
	Width		Distance	The transversal extent of the helicopter air taxiway		1m	essential	surveyed		
Helicopter air transit route	Width		Distance	The transversal extent of the helicopter air transit route		1m	essential	Surveyed		
INS Checkpoint	Position		Point	Geographical location of the INS check point	where available	0.5m	routine	surveyed	1/100 sec	1/100 sec
Aircraft Stand	Aircraft stand points	Position	Point	Geographical location of aircraft stand point		0.5m	routine	surveyed	1/100 sec	1/100 sec
	Stand guidance line	Geometry	Line	Geographical location of stand guidance line		0.5m	essential	surveyed	1/100 sec	
		Elevation	Elevation	Parking guidance line points elevation		1m	essential	surveyed		
Helicopter stand	Position		Point	Geographical location of helicopter stand point/ INS checkpoints		0.5m	essential	surveyed	1/100 sec	
De-Icing Area	Geometry		Polygon	Geographical location of de-icing area		1m	routine	surveyed	1/10 sec	1 sec

TABLE S1—2 Airspace Data

Subject	**Property**	**Sub property**	**Type**	**Description**	**Note**	**Accuracy**	**Integrity**	**Origin Type**	**Pub. Resolution.**	**Chart Resolution.**
ATS Airspace	Lateral limits		Polygon	FIR, UIR		2 km	routine	declared	1 min	as plotted
				TMA, CTA		100 m	essential	calculated	1 sec	as plotted
				CTR		100 m	essential	calculated	1 sec	as plotted
	Vertical Limits	Upper limit	Altitude	The upper limit of the airspace						
		Lower limit	Altitude	The lower limit of the airspace		50 m	routine	calculated	50 m or 100 ft	50 m or 100 ft
Special activity airspace	Name		Text	The name given to the airspace by a responsible authority						
	Type		Code list	Type of special activity airspace (Prohibited Area, Restricted Area, Danger Area, Military Execise Area, Military Training Area, Air Defence Identification Zone (ADIZ),Other)						
	Lateral limits		Polygon	inside CTA/CTR		100 m	essential	calculated	1 sec	as plotted
				outside CTA/CTR		2 km	routine	declared	1 min	as plotted

TABLE S1—3 ATS And Other Routes Data

Subject	Property	Sub property	Type	Description	Note	Accuracy	Integrity	Origin Type	Pub. Resolution.	Chart Resolution.
Route Segment	Navigation specification		Text	Designation of the navigation specification(s) applicable to a specified segment(s) - There are two kinds of navigation specifications: Required navigation performance (RNP) specification. A navigation specification based on area navigation that includes the requirement for performance monitoring and alerting, designated by the prefix RNP, e.g. RNP 4, RNP APCH. Area navigation (RNAV) specification. A navigation specification based on area navigation that does not include the requirement for performance monitoring and alerting, designated by the prefix RNAV, e.g. RNAV 5, RNAV 1.						
	Track		Bearing	Track, VOR radial or magnetic bearing of a route segment		1/10 degree (terminal arrival departure)	routine (terminal arrival departure)	calculated (terminal arrival departure)	1 degree (terminal arrival departure)	1 degree (terminal arrival departure)
	Change-over point		Point	The point at which an aircraft navigating on an ATS route segment defined by reference to very high frequency omnidirectional radio ranges is expected to transfer its primary navigational reference from the facility behind the aircraft to the next facility ahead of the aircraft.	in case of VOR radial					
	Length		Distance	The geodesic distance between from point and to point	Airway segments length	1/10 km	routine	calculated	1/10 km or 1/10 NM	1 km or 1 NM
	MEA		Altitude	Minimum en-route altitude (MEA). The altitude for an en-route segment that provides adequate reception of relevant navigation facilities and ATS communications, complies with the airspace structure and provides the required obstacle clearance.	Lower ATS Routes	50 m	routine	calculated	50 m or 100 ft	50 m or 100 ft
	MOCA		Altitude	Minimum obstacle clearance altitude (MOCA). The minimum altitude for a defined segment of flight that provides the required obstacle clearance.	Lower ATS routes	50 m	routine	calculated	50 m or 100 ft	50 m or 100 ft
	Minimum flight altitude		Altitude	Minimum flight altitude	Helicopter route	50 m	routine	calculated	50 m or 100 ft	50 m or 100 ft
	Lateral Limits		Distance	Lateral limits of route						
Waypoint	Identification		Text	Names, coded designators or name-codes assigned to the significant point.						
	Position		Point	Geographical location of the waypoint		100 m	essential	surveyed calculated	1 sec	1 sec
	Formation	Navaid	Text	The station identification of the reference VOR/DME						
		Bearing	Bearing	The bearing from the reference VOR/DME, if the waypoint is not collocated with it.	Bearing used for the formation of an en-route fix	1/10 degree	routine	calculated	1/10 degree	1/10 degree
		Distance	Distance	The distance from the reference VOR/DME, if the waypoint is not collocated with it.	Distance used for the formation of an en-route fix	1/10 km	routine	calculated	1/10 km or 1/10 NM	2/10 km (1/10 NM)
Enroute holding	Identification		Text	Identification of the holding procedure						
	Fix		Text	Identification of the holding procedure fix						
	Waypoint		Point	Geographical location of the holding waypoint		100m	essential	surveyed calculated	1 sec	1 sec

TABLE S1—4 Instrument Flight Procedure Data

Subject	Property	Sub property	Type	Description	Note	Accuracy	Integrity	Origin Type	Pub. Resolution.	Chart Resolution.
Procedure	OCA/H	Altitude	Altitude	The lowest altitude used in establishing compliance with appropriate obstacle clearance criteria.	APCH	as specified in Doc 8168	essential			as specified in Doc 8168
		Height	Height	The lowest height above the elevation of the relevant runway threshold or the aerodrome elevation as applicable, used in establishing compliance with appropriate obstacle clearance criteria.	APCH	as specified in Doc 8168	essential			as specified in Doc 8168
Procedure segment	Procedure altitude/height		Altitude/ Height	A specified altitude/height flown operationally a tor above the minimum altitude/ height and established to accommodate a stabilized descent ata prescribed descent gradient/angle in the intermediate/final approach segment.	SID, STAR, APCH certain segments only	as specified in Doc 8168	essential			as specified in Doc 8168
	MOCA		Altitude	The minimum altitude for a defined segment that provides the required obstacle clearance.	SID, STAR, APCH					
	Distance		Distance	Geodesic distance to the nearest tenth of a kilometer or tenth of a nautical mile between each successive designated significant point;		1/100 km	essential	calculated	1/100 km or 1/100 NM	1 km or 1 NM
	True bearing		Bearing	True track to the nearest tenth of a degree to the nearest degree between each successive significant point;	SID, STAR, APCH	1/10 degree	routine	calculated	1/10 degree	1 degree
	Magnetic bearing		Bearing	Magnetic track to the nearest tenth of a degree to the nearest degree between each successive significant point;	SID, STAR, APCH	1/10 degree	routine	calculated	1 degree	1 degree
Final approach segment	LTP/FTP	Position	Point	Latidude and Longitude of the LTP/FTP		0.3 m (1 ft)	critical		0.0005” (0.01”)	
		Ellipsoid height	Elevation	The height of the LTP/FTP above the WGS-84 ellipsoid		0.25 m	critical		0.1 m	
		Orthometric height	Elevation	The height of the LTP/FTP as related to the geoid and presented as an MSL elevation						
	FPAP			Flight path alignment point (FPAP)						
		Position	Point	Latidude and Longitude of the FPAP		0.3 m (1 ft)	critical		0.0005” (0.01”)	
		Orthometric height	Elevation	The height of the FPAP as related to the geoid and presented as an MSL elevation						
	TCH		Height	Approach Threshold Crossing Height (TCH) - The designated crossing height of the flight path angle above the LTP (or FTP).		0.5 m	critical	calculated	0.05 m	
	GPA		Value	Glide Path Angle (GPA) - The angle of the approach path (glide path) with respect to the horizontal plane defined according to WGS-84 at the LTP/FTP.		0.01°	N/A		0.01°	
	Course Width at threshold		Value	The semi-width of the lateral course width at the LTP/FTP, defining the lateral offset at which the receiver will achieve full-scale deflection.		N/A	critical		0.25 m	
	Delta Length Offset		Distance	The distance from the stop end of the runway to the FPAP. It defines the location where lateral sensitivity changes to the missed approach sensitivity.		N/A	N/A		8 m	
	HAL		Value	Horizontal Alert Limit	SBAS only					
	VAL		Value	Vertical Alert Limit	SBAS only					

	FAS Data Block		Text	Binary string describing the Final Approach Segment (FAS) data block generated with an appropriate software tool. The FAS data block is set of parameters to identify a single precision approach or APV and define its associated approach						
	CRC Remainder		Text	An 8-character hexadecimal representation of the calculated remainder bits used to determine the integrity of the FAS data block data during transmission and storage.						
Procedure fix	Position		Point	Geographical location of the fix	En-route navaid and fixes, holding, STAR/SID points	100 m	essential	surveyed / calculated	1 sec	1 sec
					Final approach fixes/points and other essential fixes/points comprising the instrument approach procedure	3 m	essential	surveyed / calculated	1/10 sec	1 sec
	Formations	Navaid	Text	The station identification of the reference VOR/DME						
		Bearing	Bearing	Bearing used for the formation of a terminal fix	1/10 degree	routine	calculated	1/10 degree	1/10 degree	Bearing used for the formation of a terminal fix
				Bearing used for the formation of an instrument approach procedure fix	1/100 degree	essential	calculated	1/100 degree	1/10 degree	Bearing used for the formation of an instrument approach procedure fix
		Distance	Distance	The distance from the reference VOR/DME, if the waypoint is not collocated with it.		1/100 km	essential	calculated	1/100 km or 1/100 NM	2/10 km (1/10 NM)
Procedure Holding	Fix		Point	Geographical location that serves as a reference for a holding procedure.		same as proc fix				Fix
	Inbound course		Angle	Inbound true course					1/10 degree	
	Outbound course		Angle	Outbound true course					1/10 degree	
	Leg distance		Distance	Outbound distance of the leg					1/10 km or 1/10 NM	
	Turn direction		Value	Direction of the procedure turn						
	Minimum altitude		Altitude	Minimum holding level to the nearest higher 50 m or 100 ft/ flight level		50 m	routine	calculated	50 m or 100 ft/flight level	
	Maximum altitude		Altitude	Maximum holding level to the nearest higher 50 m or 100 ft/ flight level					50 m or 100 ft/flight level	
	Speed		Value	Maximum indicated air speed					10 kts	
Helicopter Procedure Specifics	HCH		Height	Heliport crossing height		0.5 m	essential	calculated	1 m or 1 ft	1 m or 1 ft
	IDF		Point	Initial departure fix	DEP					
	MAPt		Point	Missed Approach Point	APCH					

TABLE S1—5 Radio Navigation Aids/Systems Data

Subject	**Property**	**Sub property**	**Type**	**Description**	**Note**	**Accuracy**	**Integrity**	**Origin Type**	**Pub. Resolution.**	**Chart Resolution.**
Radio navigation aid	Name		Text	The textual name assigned to the navaid						
	Purpose		Code list	Indication whether navigation aid serves en-route (E), aerodrome (A) or dual (AE) purposes.						
	Magnetic Variation	Angle	Angle	The magnetic variation at the radio navigation aid	ILS Localizer	1 degree	essential	surveyed	1 degree	
					NDB	1 degree	routine	surveyed	1 degree	

		Date	Date	The date on which the magnetic variation had the corresponding value.						
	Position		Point	Geographical location of the radio navigation aid		3 m	essential	surveyed	1/10 sec	as plotted
					GBAS Ref Point	1 m				
					Enroute	100 m	essential	surveyed	1 sec	
	Elevation		Elevation	The elevation of the transmitting antenna of DME The elevation of GBAS reference point	DME	30m (100ft)	essential	surveyed	30 m (100 ft)	30 m (100 ft)
					DME/P	3 m	essential	surveyed	3 m (10 ft)	
					GBAS Ref Point	0.25 m	essential		1 m or 1 ft	
	Ellipsoidal height		Height	The ellipsoid height of the GBAS reference point,	GBAS					
	Localizer alignment	Bearing	Bearing	The localizer course	ILS Localizer	1/100 deg	essential	surveyed	1/100 degree (if true)	1 degree
		Type	Text	Type of localizer alligment, true or magnetic	ILS Localizer					
	Zero azimuth alignment		Bearing	MLS zero azimuth alignment	MLS	1/100 deg	essential	surveyed	1/100 degree (if true)	1 degree
	Angle		Angle	The angle of the glide path of an ILS or the normal glide path angle for the MLS installation	ILS GP / MLS					
	RDH		Value	The value of the ILS Reference Datum Height (ILS RDH).	ILS GP	0.5m	critical	calculated	0.1m or 0.1ft	0.5m or 1ft
	Localizer antenna rwy end distance		Distance	ILS localizer runway/FATO end distance	ILS Localizer	3 m	routine	calculated	1 m or 1 ft	as plotted
	ILS glideslope antenna TRSH distance		Distance	ILS glideslope antenna - threshold distance along centerline	ILS GP	3 m	routine	calculated	1 m or 1 ft	as plotted
	ILS marker TRSH distance		Distance	ILS marker - threshold distance	ILS	3 m	essentail	calculated	1 m or 1 ft	2/10 km (1/10 NM)
	ILS DME antenna TRSH distance		Distance	ILS DME antenna - threshold distance along centerline	ILS	3 m	essential	calculated	1 m or 1 ft	as plotted
	MLS azimuth antenna rwy end distance		Distance	MLS azimuth antenna - runway/FATO end distance	MLS	3 m	routine	calculated	1 m or 1 ft	as plotted
	MLS DME antenna TRHS distance		Distance	MLS DME/P antenna - threshold distance along centre line	MLS	3 m	essential	calculated	1 m or 1 ft	as plotted
	Signal polarization		Code list	GBAS signal polarization (GBAS/H or GBAS/E)	GBAS					
	DOC		Text	Designated operational coverage (DOC or stadard service volume SSV) as range or service volume radius from the navaid / GBAS reference point, height and sectors if required						
Aeronautical ground lights	Intensity		Value	Intensity of the light of the beacon					1000 candela	
Special navigation system	Position		Point	Geographical location of the special navigation system		100m	essential	surveyed / calculated		

Table S1—6 Obstacle Data

Subject	**Property**	**Sub property**	**Type**	**Description**	**Note**	**Accuracy**	**Integrity**	**Origin Type**	**Pub. Resolution.**	**Chart Resolution.**
Obstacle	Obstacle identifier		Text	Unique identifier of obstacle						
	Operator / Owner		Text	Name and Contact information of obstacle operator or owner						
	Geometry type		Code list	An indication whether the obstacle is a point, line or polygon.						
	Horizontal position		Point Line Polygon	Obstacles in Area 1		50 m	routine	surveyed	1 sec	as plotted
				Obstacles in Area 2 (including 2a, 2b, 2c, 2d, take-off flight path area and obstacle limitation surfaces)		5 m	essential	surveyed	1/10 sec	1/10 sec
				Obstacles in Area 3		0.5 m	essential	surveyed	1/10 sec	1/10 sec

				Obstacles in Area 4		2.5 m	essential	surveyed		
	Horizontal extent		Distance	Hoizontal extent of the obstacle						
	Elevation		Elevation	Obstacles in Area 1		30 m	routine	surveyed	1 m or 1 ft	3 m (10 ft)
	Height		Height	Obstacles in Area 2 (including 2a, 2b, 2c, 2d, take-off flight path area and obstacle limitation surfaces)		3 m	essential	surveyed	1 m or 1 ft	1 m or 1 ft
				Obstacles in Area 3		0.5 m	essential	surveyed	0.1 m or 0.1 ft 0.01 m	1m or 1 ft
				Obstacles in Area 4		1 m	essential	surveyed	0.1 m	
	Type		Text	Type of obstacle						
	Date and time stamp		Date	Date and time the obstacle was created						
	Operations		Text	Feature operations of mobile obstacles						
	Effectivity		Text	Effectivity of temporary types of obstacles						

Table S1—7. Terrain Data Numerical Requirements

	Area 1	**Area 2**	**Area 3**	**Area 4**
Post spacing	3 arc seconds (approx. 90 m)	1 arc second (approx. 30 m)	0.6 arc seconds (approx. 20 m)	0.3 arc seconds (approx. 9 m)
Vertical accuracy	30 m	3 m	0.5 m	1 m
Vertical resolution	1 m	0.1 m	0.01 m	0.1 m
Horizontal accuracy	50 m	5 m	0.5 m	2.5 m
Confidence level	90%	90%	90%	90%
Integrity classification	routine	essential	essential	essential
Maintenance period	as required	as required	as required	as required

Table S1—8 Data Types

Type (1)	**Description (2)**	**Data elements (3)**
Point	A pair of coordinates (latitude and longitude) referenced to the mathematical reference ellipsoid which define the position of the point on the surface of the Earth.	Latitude
		Longitude
		Horizontal reference system
		Units of measurement
		Horizontal accuracy achieved
Line	Sequence of Points defining a linear object	Sequence of Points
Polygon	Sequence of Points forming the boundary of the polygon. The first and last Point are identical.	Closed sequence of Points
Height	The vertical distance of a level, point or an object considered as a point, measured from a specific datum.	Numerical value
		Vertical reference system
		Units of measurement
		Vertical accuracy achieved
Altitude	The vertical distance of a level, a point or an object considered as a point, measured from mean sea level.	Numerical value
		Vertical reference system
		Units of measurement
		Vertical accuracy achieved
Elevation	The vertical distance of a point or a level, on or affixed to the surface of the earth, measured from mean sea level.	Numerical value
		Vertical reference system
		Units of measurement
		Vertical accuracy
Distance	A linear value	Numerical value
		Units of measurement
		Accuracy achieved
Angle / Bearing	An angular value	Numerical value
		Units of measurement
		Accuracy achieved
Value	Any measured, declared or derived value not listed above.	Numerical Value
		Units of Measurement
		Accuracy achieved
Date	A calendar date referencing a particular day or month	Text
Schedule	A repetitive time period, composed of one or more intervals or special dates (e.g. holidays) occurring cyclically	Text
Code list	A set of predefined Text strings or values	Text
Text	Free text	String of characters without constraints