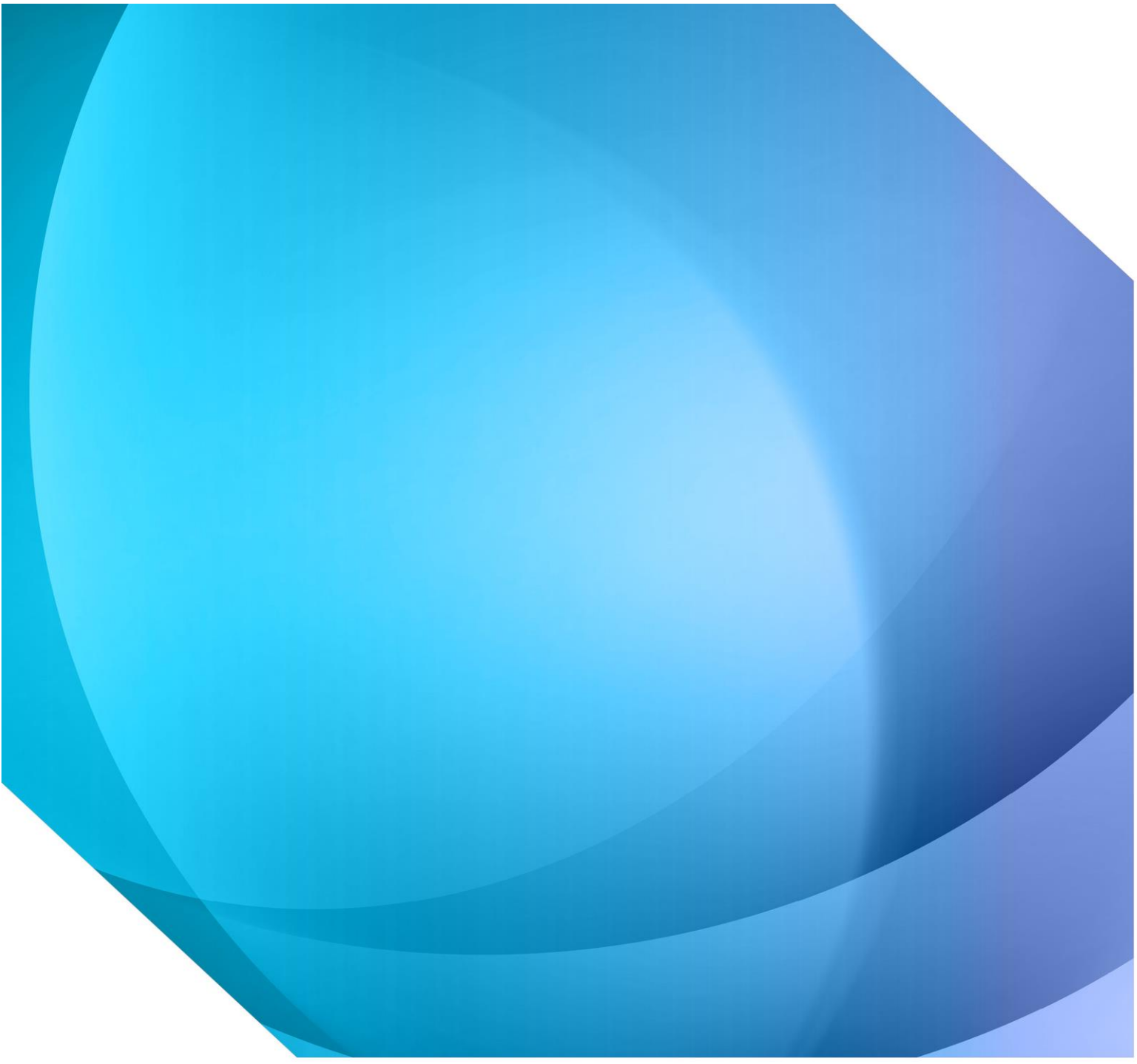
Safety and Airspace Regulation Group

Aerodrome Survey Guidance

CAP 1732



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Introduction

This document provides additional guidance for aerodrome operators and other data originators (including contracted activities) to support compliance with the Regulation EU 139/2014, EU 73/2010 and ICAO Annex 4, Annex 11 and Annex 14. This guidance also complements AMC and GM to the EU 139/2014, ICAO PANS-AIM and EUROCONTROL - Terrain and Obstacle Data (TOD) Manual and should be used in conjunction with those documents to ensure that one survey can provide all mandatory data items and all relevant requirements are being met. The main purpose of this document is to achieve a harmonized approach to aerodrome surveys and effectively support the implementation of data quality requirements.

The guidance contained in CAP 1732 applies to aerodromes that are certificated by the CAA under the EASA Common Requirements (EU 139/2014) and to aerodromes that have instrument approach procedures (IFP). This guidance therefore replaces the applicable information provided in CAP 232 for those aerodromes.

All other aerodromes (VFR aerodromes), should continue to comply with the requirements and guidance in CAP232 as applicable.

CAP 1732 is based on CAP 232 principles and has been created to address the current requirements noted above. CAP 1732 maintains the proportionate approach included previously in CAP 232 (e.g. list of dominant obstacles, .crc file format etc.). It also introduces both a new way of presenting aerodrome data in electronic TOD (eTOD) datasets and describes the submission of the data to AIS.

Purpose

It is important that all those responsible for the provision of terrain and obstacle data are aware of the applications in which this data may be utilised, as these determine the data quality requirements.

The purpose of the aerodrome survey is to provide eTOD necessary to:

- control and monitor the aerodrome obstacle environment;
- be promulgated in the AIP, on aeronautical charts and other AIS products;
- be used in air navigation applications such as:

  a) ground proximity warning systems with forward looking terrain avoidance functions and minimum safe altitude warning systems;

  b) determination of contingency procedures for use in the event of an emergency during a missed approach or take-off;

  c) aircraft operating limitations analysis;

  d) instrument flight procedure design (including circling procedure);

  e) determination of en-route “drift-down” procedures and en-route emergency landing locations;

  f) advanced surface movement guidance and control systems;

  g) aeronautical chart production and on-board databases;

  f) geofencing;

  and other purposes.

For more information, see EUROCONTROL-Terrain and Obstacle Data Manual.

Definitions

Accuracy	A degree of conformance between the estimated or measured value and the true value.
Aeronautical Data Quality Implementing Rule (ADQ IR)	European Regulation (EU) No 73/2010 & 1029/2014 laying down the requirements for the Quality of Aeronautical Data and Aeronautical Information for the Single European Sky.
Aerodrome Mapping Data (AMD)	Information that represents standardised aerodrome features for a defined area, including geospatial data and metadata.
Aeronautical Data	A representation of aeronautical facts, concepts or instructions in a formalised manner suitable for communication, interpretation of processing.
Aeronautical Information (AI)	Information resulting from the assembly, analysis and formatting of aeronautical data.
Aeronautical Information Management (AIM)	The dynamic, integrated management of aeronautical information services – safely, economically and efficiently – through the provision and exchange of quality-assured digital aeronautical data collaboration with all parties.
Aeronautical Information Publication (AIP)	A publication issued by or with the authority of a State and containing aeronautical information of a lasting character essential to air navigation.
Aeronautical Information Service Provider (AISP/AIS)	The organisation responsible for the provision of an aeronautical information service, certified in accordance with European Commission Regulation No 2096/2005.
Air Navigation Service Provider (ANSP)	Any public or private entity providing air navigation services for general air traffic.
AIP Sponsor	Person nominated by the Authorised Source to provide data to AIS. In some cases Authorised Source will be the only Sponsor.
Authorised Source	Person ultimately accountable for aeronautical information published in the IAIP. Normally Accountable Manager or a competent person formally appointed by the Accountable Manager to be directly responsible for all aeronautical data activities and aeronautical information provision activities in the organisation. Authorised source can sign a formal arrangement with AIS on provision of aeronautical data/information on behalf of the organization. Authorised source can nominate individuals (“AIP Sponsors”), who are responsible for submitting changes to AIS products within a clearly defined scope of authorised changes (data items).
Cyclic Redundancy Check (CRC)	A mathematical algorithm applied to the digital expression of data that provides a level of assurance against loss or alteration of data.
Database (db)	One or more files of data so structured that appropriate applications may draw from the files and update them.
Data Chain	Describes all the elements of the Controlled and Harmonised Aeronautical Information Network from origination through to publication.

Data Item	A single attribute of a complete data set, which is allocated a value that defines its current status.
Data Origination (DO)	The creation of a new data item with its associated value, the modification of the value of an existing data item or the deletion of an existing data item.
Data Originator	Person or persons authorised to originate aeronautical information and data on behalf of the 'Authorised Source'.
Data Quality (DQ)	A degree or level of confidence that the data provided meets the requirements of the data user in terms of accuracy, resolution and integrity.
Data Validation	The process of ensuring that data meets the requirements for the specified application or intended use.
Data Verification	The evaluation of the output of an aeronautical data process to ensure correctness and consistency with respect to the inputs and applicable data standards, rules and conventions used in that process.
Derived Point	A point in space not determined by survey but derived from source data that has been defined in WGS-84.
Electronic Obstacle	A digital data-set representing the vertical and horizontal extent of the obstacle
Electronic Terrain	A digital data-set representing the terrain surface in the form of continuous elevation values at all intersections (points) of a defined grid, referenced to a common datum.
Ellipsoid Height	The height related to the reference ellipsoid, measured along the ellipsoidal outer normal through the point in question.
Essential Data	ICAO integrity level equivalent to a Data Assurance Level of DAL 2.
Extensible Mark-up Language (XML)	A version of SGML that allows design of a customized mark-up language, used to allow for easy interchange of documents and data on the World Wide Web or between software components.
Geoid	The equipotential surface in the gravity field of the Earth, which coincides with the undisturbed mean sea level extended continuously through the continents.
Geospatial	Information that identifies where particular features are in relation to the earth's surface.
Integrated Aeronautical Information Package (IAIP)	A package that consists of the following elements: a) Aeronautical Information publications (AIP) inc amendments. b) Supplements to the AIP. c) NOTAM and pre-flight bulletins. d) Aeronautical information circulars. e) Checklists and valid NOTAMs.
Integrity	A degree of assurance that a data item and its value have not been lost or altered since the data origination or authorised amendment.
Metadata	A set of data that describes and gives information about other data.

Obstacle data	All fixed (whether temporary or permanent) and mobile objects, or parts thereof, that penetrate the identified obstacle assessment surfaces or whose height above ground level exceeds a defined minima.
Resolution	A number of units or digits to which a measured or calculated value is expressed and used.
Routine Data	ICAO integrity level equivalent to a Data Assurance Level of DAL 3.
Survey Data	Geospatial data that is determined by measurement or survey.
Surveyed Point	A clearly defined physical point, specified by latitude and longitude, that has been determined by a survey in accordance with CAP 1732.
Take-off flight path area	
Terrain Data	Data about the surface of the earth containing naturally occurring features such as mountains, hills, ridges, valleys, bodies of water, permanent ice and snow obstacles;
Unified Modelling Language (UML)	UML is an ISO Standard for modeling objects and a refinement of earlier Oriented Design and Object-Oriented Analysis methodologies.

Chapter 1 – Aerodrome Operator - Obligations

The aerodrome operator shall implement and maintain a quality management system covering its aeronautical data activities and aeronautical information provision activities, including its defined procedures for meeting safety and security management objectives with respect to aeronautical data activities; and aeronautical information provision activities (ADR.OR.D.007). When the aerodrome operator contracts any part of its data origination activity to another organisation, the contracted organisation works under the oversight of the aerodrome operator (ADR.OR.D.010). The aerodrome operator is required to have formal arrangements with organisations with which it exchanges aeronautical data and/or aeronautical information (ADR.OPS.A.010) and which exchange data and/or information on behalf of the aerodrome operator.

The establishment of a Formal Arrangement between the aerodrome operator and an external organisation providing aeronautical data is essential in achieving compliance with the international and European requirements on aeronautical data. Appendix 1 includes guidance on the content of Formal Arrangements between the aerodrome operator and an external organisation providing surveyed aeronautical data for the aerodrome.

Ultimate responsibility for aerodrome data provided by a contracted organisation always remains with the aerodrome operator.

All aerodrome operator requirements regarding aeronautical data are to be found in Annex III (Part-ADR.OR) and Annex IV (Part-ADR.OPS) to regulation EU 139/2014, ICAO Annex 14 and 15 and ICAO PANS-AIM. In the case of contracted activities to external organisations for the origination of aeronautical data and aeronautical information, data origination requirements for such organisations are to be found in ATM/ANS.OR.085 of Annex III of Commission Implementing Regulation (EU) 2017/373.
To provide data compliant with the aeronautical data quality requirements, Aerodrome Operators should deliver a full ADQ compliant survey including all of the elements detailed in this CAP. Aerodrome operators should review their IFPs within 5 months following the ADQ compliant survey.
As advised, in the Information Notice IN-2017/019 (11 May 2017), the CAA has updated the oversight programme to include verification of the compliance of Aerodrome Operators with the data requirements. Audits are aligned with scheduled 5-year Instrument Flight Procedure Reviews (provided by Aerodrome Operators).

To assist Aerodrome Operators prepare the necessary evidence in order to demonstrate their compliance with EU 139/2014 and EU 73/2010 during audits, the CAA has created a 5-year Transition Plan. The UK AIS Provider will comply with the regulation from 5 October 2018 with the introduction of the new AIM system and subsequent production of the first ADQ AIP (AIRAC 01/2019). In early 2019 the new AIM system will be opened to Authorised Sources to enable ADQIR compliant data to be submitted via a new web-based interface (the Data Originator Portal) directly into the system.

Aerodromes will, from September 2018 be required to complete Oversight Question Banks relating to ADQ IR. Aerodrome operators will be required to deliver an ADQ-compliant survey before the date of their next scheduled 5-year Instrument Flight Procedure (IFP) review at the latest. December 2023 is the date when all data items in the AIP that are within the scope of the ADQ requirements are expected to be ADQ compliant.

Chapter 2 – Minimum content of the aerodrome survey

2.1 NUMERICAL DATA QUALITY REQUIREMENTS

All EASA certificated aerodromes and aerodromes with Instrument Flight Procedures (IFP) are required to provide numerical data and information classified by ICAO as “critical”, “essential” or “routine” (integrity level) in accordance with the requirements on the quality of aeronautical data and aeronautical information specified in the relevant ICAO Annexes, ICAO Data Catalogue and European Regulations (EU) No 73/2010, 2017/373 and 139/2014. Any surveyed data that does not meet the accuracy and integrity requirements will be indicated in the AIP as non-compliant.

2.2 OBSTACLES

There are at least two officially recognised definitions of an obstacle used in aviation (ICAO Annex 15 and Eurocontrol TOD Manual). For the purpose of this guidance the Eurocontrol definition has been used as it reflects the wider AIM context of obstacle data:

All fixed (whether temporary or permanent) and mobile objects, or parts thereof, that penetrate the identified obstacle assessment surfaces or whose height above ground level exceeds a defined minima.

2.3 eTOD

Specific UK guidance on data collection surfaces (eTOD *PLUS*) was created on the basis of data collection areas and surfaces defined by ICAO Annex 15 and EU 139/2014 as Electronic Terrain and Obstacle Data Areas (eTOD) 1-4. These surfaces are amended in this guidance, to ensure that one aerodrome survey will deliver all the data necessary to generate Obstacle Limitation Surfaces, design Instrument Flight Procedures and produce the required charts. **A full description of the eTOD *PLUS* policy, including the comparison between eTOD (as required by Annex 15 and EU 139/2014) and eTOD *PLUS* can be found in Appendix 2.**

A graphical representation of the amendments to the defined eTOD surfaces can be found in Appendix 4.

To achieve compliance with EU 139/2014 and requirements included in ICAO Annex 4, Annex 11 and Annex 14, eTOD Areas 1-4 should always be used as a reference in the Aerodrome Survey Report.

Further guidance on Terrain and Obstacle Data can be found in *EUROCONTROL - Terrain and Obstacle Data Manual*.

2.4 HORIZONTAL CONTROL

Co-ordinates will be required in WGS-84 format (required format for published data) and appropriate National Grid (for plotting and design on topographical charts).

Survey control points should conform to the ICAO DOC 9674-AN/946 (WGS-84 Manual).

WGS-84 geodetic control and format requires that the methods deployed must prove that the accuracy for the various surveys has been met. Data originators undertaking these surveys are responsible for the accuracy of the control data and any transformation sets used. An analysis of the accumulated

error, evidence confirming the required accuracies have been met and the transformation parameters used should be included in the Survey Report.

Note: The CAA recognises the fact that all the geographical positions in the UK that have been supplied in the past were ETRF89 and the consistency across all surveys should be maintained. Therefore, it is acceptable to use ETRF89 reference frame and Newlyn Datum for vertical reference in the UK. This position statement may be revised when the difference between ETRF89 and ITRF2008 becomes intolerable.

2.5 VERTICAL CONTROL

Orthometric and ellipsoidal elevations are required.

The variable separation between the geoid and the reference ellipsoid may give rise to inaccuracies greater than the allowable specified. For the computation to transform ellipsoidal to orthometric elevations a geoid model should be used. If a geoid model is not available extra care must be taken to ensure good geometry of the initial control points. In all cases appropriate survey checks should be applied to prove the quality of vertical control. These checks should be included within the survey report.

Standard survey practice should be used to produce the elevation to the required specification accuracy and the integrity of the control points used needs to be proved.

2.6 REQUIRED DATA ITEMS

The aerodrome survey should cover all data items required by ICAO Annex 14 and 15 and EU 139/2014 as well as all the data items necessary to be included on the charts required by ICAO Annex 4 and relevant for that aerodrome [referenced below].

- Aerodrome/Heliport Chart
- Type A – Aerodrome Obstacle Chart or Aerodrome Terrain and Obstacle Chart (electronic). *Note: this is not the Aerodrome Ground Movement Chart (recommendation).*
- Precision Approach Terrain Chart (for all precision approach runways II and III) or Aerodrome Terrain and Obstacle Chart (electronic).
- Enroute chart (for FIR).
- Visual Approach Chart (if established).
- Area Chart (where ATS routes are complex and cannot be adequately shown on the Enroute Chart).
- SID (if established).
- STAR (if established).
- IAP (if established).

The applicable data items and numerical requirements can be found in the ICAO Data Catalogue (PANS-AIM Appendix 1). It is essential that the data set describes the obstacles using the attributes listed in ICAO PANS-AIM APPENDIX 6 and/or the equivalent tables in EU 139/2014: GM4 ADR.OPS.A.005(a) Aerodrome data Table 2 and AMC1 ADR.OPS.A.010 Data quality requirements. Metadata should be provided for every data set.

Note 1: AMC and GM to EU 139/2014, ANNEX IV SUBPART A — AERODROME DATA (ADR.OPS.A) provides comprehensive guidance on measuring and reporting aerodrome data.

Note 2: When intersection take-offs are performed, the datum line from which the reduced runway declared distances for take-off needs to be determined.

Note 3: Each obstacle that has been collected should be allocated a unique identifier which will remain the primary means of identifying the obstacle throughout its life and should not be changed as a result of a resurvey or reissue of a data set. The identifier should be independent of any data set within which it is contained, such that if it were to appear in more than one area or delivered data

set, it should retain the same identifier. If it is possible to identify the obstacle while resurveying, the UID should be maintained even if some data items (like height) have changed. For more information see EUROCONTROL-Terrain and Obstacle Data Manual.

Note 4: Data originators should provide and maintain identification references for all obstacles. In addition to the identification references provided by data originators, AIS will generate UUIDs for all data received in non AIXM format.
UUIDs are mandatory in AIXM files and therefore prior to transitioning to submission of AIXM to AIS, AIS will be able to provide existing UUID's for all AIS stored obstacles. AIS will also publish the mechanism for generating UUIDs consistently.
Once and Authorised Source has transitioned to AIXM and is generating UUIDs for new features, AIS will retain all UUIDs provided by Authorised Source as the UUID of the feature.

2.7 OBSTACLE LIMITATION SURFACES

Every survey in the scope of this guidance should identify penetrations of the obstacle limitation surfaces listed below:

• Transitional Surface

• Take-Off Climb Surface

• Approach Surface

• Inner Horizontal Surface

• Conical Surface

• Outer Horizontal Surface

• Obstacle Free Zone Surface, comprising the inner approach, inner transitional and landing surfaces (precision approach only).

2.8 CONTENT OF THE SURVEY PACKAGE

EASA certificated aerodromes or aerodromes with Precision IFPs CAT II and III should provide to AIS a full survey package that includes:

I. Survey Report.
II. Area 2 obstacle dataset [Appendix 5 .crc file named egxx_2etod00.crc]
III. Area 2 terrain dataset [GeoTIFF or GML]
IV. Area 3 obstacle dataset [Appendix 5 .crc file named egxx_3etod00.crc]
V. Area 3 terrain dataset [GeoTIFF or GML]
VI. Area 4 obstacle dataset (for CAT II and III) [Appendix 5 .crc file named egxx_4etod00.crc]
VII. Area 4 terrain dataset - for CAT II and III [GeoTIFF or GML]
VIII. Penetrations of the aerodrome obstacle limitation surfaces [Appendix 5 .crc file named Annex B crc named egxx_ols00.crc]
IX. All features identified as obstacles including dominant obstacles - MASTER OBSTACLES FILE [Appendix 5 .crc file named egxx_obst00.crc]
X. Aerodrome Plan in digital format (in Adobe PDF) and Aerodrome Facilities file with all facilities surveyed for the purposes of the Aerodrome Plan [PDF + Appendix 5 .crc file named egxx_ad00.crc]
XI. Runway and declared distance file [Appendix 5 .crc file named egxx_Rdd00.crc]
XII. A list of the dominant obstacles [Appendix 5 .crc file or.xls spreadsheet]
XIII. A list of AIP AD 2.10 obstacles [.xls spreadsheet]

XIV. Type A dataset - Objects in the take-off flight path area which project above a plane surface having a 1.2 per cent slope and having a common origin with the take-off flight path area (take-off flight path obstacle dataset) [Appendix 5 .crc file named egxx_tofp00.crc]

For all file names "egxx" is the ICAO indicator code for the surveyed aerodrome and "00" is the year of the survey.

EASA certificated aerodromes or aerodromes with Precision IFPs CAT II and III should deliver an Area 2 and 3 obstacle data set to AIS to be published in their AIP section AD 2.10.

All other aerodromes published in the UK AIP (civil) should provide to AIS a full survey package that includes as a minimum:

I. Survey Report
II. Area 2a obstacle dataset [Appendix 5 .crc file named egxx_2etod00.crc]
III. Area 2a terrain dataset [GeoTIFF or GML]
IV. Take-off flight path area terrain dataset
V. Penetrations of the aerodrome obstacle limitation surfaces [Appendix 5 .crc file named egxx_ols00.crc]
VI. All features identified as obstacles including dominant obstacles - MASTER OBSTACLES FILE [Appendix 5 .crc file named named egxx_obst00.crc]
VII. Aerodrome Plan in digital format (in Adobe PDF) and Aerodrome Facilities file with all facilities surveyed for the purposes of the Aerodrome Plan [PDF + Appendix 5 .crc file named egxx_ad00.crc]
VIII. Runway and declared distance file [Appendix 5 .crc file named egxx_Rdd00.crc]
IX. A list of the dominant obstacles [Appendix 5 .crc file or.xls spreadsheet]
X. A list of AIP AD 2.10 obstacles [.xls format]

Note 1: Non-EASA certificated aerodromes in the scope of this guidance can indicate in AD 2.10 that information on obstacles in Area 3 is not available and the obstacle data are to be provided for:

a) Area 2a

a) obstacles that penetrate the obstacle limitation surfaces;

b) obstacles that penetrate the take-off flight path area obstacle identification surface; and

c) other obstacles assessed as being hazardous to air navigation.

Note 2: The lack of Area 3 datasets will not be considered as a non-compliance at an EASA certificated CAT I aerodrome only if:

- There is an assessment [as described in Chapter 7] presenting evidence as to whether the lack of Area 3 obstacle/terrain dataset does compromise safety of operations and it has been accepted by regular aerodrome users.
- There is a plan for providing this data in the future (with a timescale).

The above documents need to be accepted by the CAA Aerodromes Team.

XI. Type A dataset - Objects in the take-off flight path area which project above a plane surface having a 1.2 per cent slope and having a common origin with the take-off flight path area (take-off flight path obstacle dataset) [Appendix 5 .crc file named egxx_tofp00.crc]

All files need to be provided with required metadata (as detailed in CAP 1054, EU 73/2010 and ICAO Annex 15).

The above describes all files that should be delivered to AIS. The Formal Arrangement between the aerodrome operator and the survey company should describe which of these files are to be provided by the surveyor to the aerodrome operator and whether the surveyor will be nominated by the aerodrome operator (authorised source) to be an AIP Sponsor of this data. Aerodrome operators will then be required to update their list of aerodrome AIP Sponsors and send it to AIS.

2.9 SURVEY REPORT & GEODETIC CONNECTION REPORT

Geodetic Connection Report (recommended for full surveys) should include the following:

1. Quality Records/Metadata Records listing (can refer to the Survey Report):

    - The data originator - Surveying organisation;
    - Date of survey;
    - Name of the persons or organisations that have interacted with the data and when;
    - Method of survey and equipment used;
    - Equipment calibration information and method of checking the survey;
    - Evidence that the accuracy requirements have been met including details of the error budget analysis;
    - amendments made to the data;
    - details of any validation and verification of the data that has been performed;
    - effective start date and time of the data;
    - the earth reference model used;
    - the coordinate system used;
    - the statistical accuracy of the measurement or calculation technique used;
    - the resolution;
    - the confidence level as required by the ICAO standards;
    - details of any functions applied if data has been subject to conversion/transformation;
    - details of any limitations on the use of the data.

2. Details of the connection of the aerodrome control network to the geodetic network
3. Aerodrome control network plan
4. Survey stations descriptions
5. Transformation parameters

Survey Report should include the following:

1. Quality Records/Metadata Records listing:

    - The data originator - Surveying organisation;
    - Date of survey;
    - Name of the persons or organisations that have interacted with the data and when;
    - Method of survey and equipment used;
    - Equipment calibration information and method of checking the survey;
    - Evidence that the accuracy requirements have been met including details of the error budget analysis;
    - amendments made to the data;
    - details of any validation and verification of the data that has been performed;
    - effective start date and time of the data;
    - the earth reference model used;
    - the coordinate system used;
    - the statistical accuracy of the measurement or calculation technique used;
    - the resolution;
    - the confidence level as required by the ICAO standards referred to in points 1 and 12 of Annex III and in other relevant ICAO standards;
    - details of any functions applied if data has been subject to conversion/transformation;
    - details of any limitations on the use of the data;
    - any differences to CAP 1732.

2. Schedules listing all obstacles that have been added or deleted since the last survey.

For traceability purposes, the complete documentation should be reissued on every occasion that a new survey amends the preceding survey.

The format of the schedules listing changes should be agreed with the Aerodrome Operator and recorded in the Formal Arrangement.

2.10 EXCHANGE FORMAT

The UK AIS provider uses aeronautical information exchange model (AIXM) to enable the management and distribution of aeronautical information services data in digital format.

Survey package should be delivered to AIS as a single zip file containing relevant files listed in Chapter 2, points 2.8 and 2.9. This zip file should be submitted to AIS as a new AIP Change Request (ACR).

Formal arrangement between the aerodrome operator and all parties with which it exchanges aeronautical data and/or aeronautical information, and which exchange aeronautical data and/or information on behalf of the aerodrome operator should include the format of the data origination report to be used (as described in Appendix 1).

The dataset specification recommended and acceptable to be used in the upstream data chain (from data origination to the submission to AIS) for aerodrome obstacles and facilities is available in Appendix 5.

Obstacle datasets will be automatically imported by AIM to AIXM 5.1, removing the need to make manual amendments to their obstacle data. Aerodrome facilities data will be typed in directly to the AIM system via the Data Originators Portal by the Authorised Source or Sponsors nominated by the Authorised Source to submit changes on behalf of the aerodrome.

Aerodrome operators are encouraged to adopt the AIXM 5.1 format for their Master obstacles file to accompany the .crc file.

All parties in the data chain are required to exchange data using electronic means. During the Transition Period transfer of encrypted data on DVDs will be acceptable when it meets conditions specified in CU 08/2014 for email exchange.

Only data included in the survey documentation can be submitted to the AIM system. Positional data and associated elevations, that determines the extent of the declared distances and runway profile should be included in the Aerodrome Facilities file.

More information about the submission of data to AIS can be found in Chapter 8.

Note 1: Eurocontrol is developing data coding guidelines for AIXM. Existing mapping documents can be found at the link: http://aixm.aero/page/data-coding-guidelines. Be aware that the Airport Mapping Requirements status is as a “proposed release”.

Chapter 3 – List of dominant obstacles

The aerodrome survey should identify the dominant obstacles in Areas 2b and 2c which will allow the IFP designers the flexibility to adjust the approach and missed-approach paths and gain the best operational advantage in terms of OCH regarding local terrain and/or airspace restrictions, against the design criteria laid down in PANS-OPS Vol II. Survey areas 2b and 2c should be divided up into a mosaic of tiles 0.5 km x 1 km, starting on each side of the runway centreline, where the longer side of the tile is perpendicular to the runway centreline.
The optimum requirement is to record the height of the three highest obstacles in each tile, thus allowing the IFP designer to calculate the most advantageous Minimum Descent Altitude/Height (MDA/H). However, in analysing the three highest obstacles in any one tile, consideration must be given to other obstacles within the same tile where such additional obstacles are located closer to the nominal flight path of an aircraft approaching or departing an aerodrome. For example, if there are three chimneys adjacent to each other near the outer edge of the tile furthest from the nominal flight path and an office building located within the same tile closer to the nominal flight path but marginally lower than the three chimneys, then all four obstacles should be declared. Situations may exist where more than three obstacles are declared within any one tile.

If it is apparent that there are significant obstacles beyond the 10 km/15 km limit, that would not be included in Area 2d obstacle dataset, the survey area should be extended longitudinally to 30 km to take account of such obstacles. A significant obstacle is one that is not shielded by an obstacle closer to the runway.

Chapter 4 – Continuous monitoring of the obstacle environment and annual review of the aerodrome survey data

Aerodrome operators are required to establish procedures for continuous monitoring of the obstacle environment. After identification of a new obstacle penetrating data collection surfaces, aerodrome obstacle data sets should be updated as soon as practically possible. Every update to the aerodrome obstacle data set should be submitted as an AIP Change Request (ACR) to NATS AIM. The impact of any new obstacle on the aerodromes' operation should be assessed and documented. The Aerodrome Manual is required to include all procedures for obstacle control and monitoring within and outside of the aerodrome boundaries, including notifications and amendment of the AIS publications (for EASA certificated aerodromes see AMC3 ADR.OR.E.005 Aerodrome manual Part E, point 18). For more information on aerodrome safeguarding see CAP 738 and IFP safeguarding CAP 785.

In addition to the continuous monitoring of the obstacle environment, aerodrome operators should conduct an annual review of their aerodrome survey data and obstacle-data activities. The annual review must be fit for purpose and should provide evidence confirming that such a review has been conducted. The Aerodrome Manual should include a procedure that describes the annual reviews of the aerodrome survey data and defines evidence that will be provided and made available to the CAA upon request.

Chapter 5 – Aerodrome data in the UK AIP

The aerodrome operator is responsible for assessing changes in their aerodrome survey for impact on their published AIP data. Impact on the IFPs can only be conducted by an Approved Procedure Designer (APD). For more information see CAP 785.

When an AIP change is identified, the aerodrome (or an AIP Sponsor nominated by the aerodrome operator) is required to inform AIS by raising an AIP Change Request (ACR) and providing supporting documentation. Every data activity conducted by a contracted organisation (i.e. survey company or APD) needs to be described in a Formal Arrangement. The ultimate responsibility for the service provided by contracted organisations always remains with the aerodrome operator (Authorised Source).

For traceability purposes, all amended (affected) survey files should be attached to ACR on every occasion that a new survey amends the preceding survey. For example: Any changes identified as affecting the Type A – Aerodrome Obstacle Chart or Aerodrome Terrain and Obstacle Chart (electronic) should result in the full provision of all affected survey files (not just the Type A dataset).

All files that need to be provided and maintained by the aerodrome operator are listed in Chapter 2 point 2.8.

Chapter 6 – Terrain data

The aerodrome operator should consider obtaining their terrain data from commercial providers, such as the Ordnance Survey (OS Terrain 5 and lower) or an equivalent provider which meets the requirements of ICAO Annex 15 and EU 139/2014.

It is essential that the data set describes terrain using the terrain attributes listed in ICAO PANS-AIM Appendix 6 and that the terrain data meets the numerical requirements detailed in ICAO Aeronautical Data Catalogue (PANS-AIM Appendix 1). Equivalent tables can be found in EU 139/2014: GM4 ADR.OPS.A.005(a) Aerodrome data Table 1 and AMC1 ADR.OPS.A.010 Data quality requirements.

An assessment of the OS Terrain Datasets has been conducted by the CAA and evidence have been obtained to achieve the level of assurance that these products meet the data quality requirements for Terrain data.

Widely available (as part of the PSMA) OS Terrain 50 dataset should be considered as the UK Area 1 Terrain dataset.

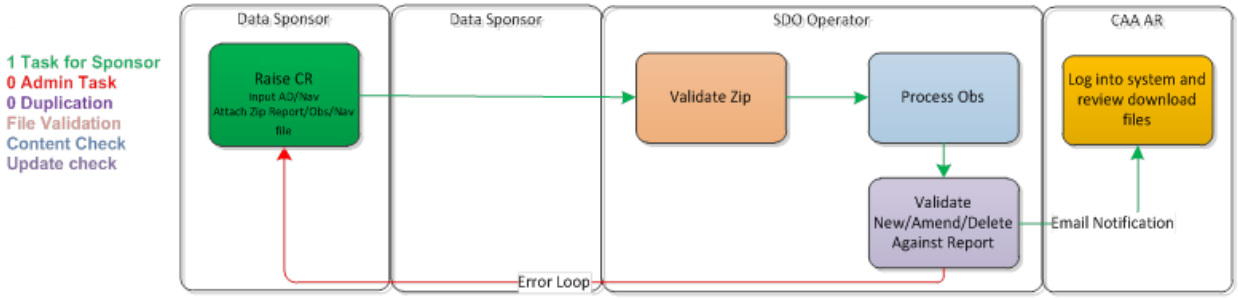
Chapter 7 – Alternative Means of Compliance

Alternative means of compliance (AltMoC) can be used to establish compliance with EU Regulations subject to prior approval by the competent authority (the CAA). Aerodrome operators may provide an assessment presenting evidence as to whether the lack of a particular TOD data area (or its part) or any other differences in requirement would not compromise the safety of operations and remains in accordance with EU 139/2014. The preparation of the assessment would require close collaboration between the aerodrome operator, ANSP and the chosen IFP designer. The assessment should also identify whether or not it is necessary to establish AltMoC. If AltMoc is needed, the aerodrome operator is to prepare an AltMoC proposal document which would require evaluation and acceptance by the CAA.

Chapter 8 – Submission of survey report

The completed submission to AIS should consist of the files specified in Chapter 2 (points 2.8-2.10).

The aerodrome operator is responsible for ensuring that every update to the aerodrome obstacle data set is submitted (with copies of all survey documents) as an AIP Change Request (ACR) to NATS AIM [see Chapter 5]. Surveys that fail to conform with the applicable requirements will be rejected and returned to the aerodrome operator. The Aerodrome Survey Submission Process is depicted on a flowchart below.



Flowchart 1. ACR Submission. Sponsor raises ACR (zip file attached), NATS AIM checks Zip file, AIM processes obstacles, checks change statement (survey report), processes other changes (AD NAV), sends to Sponsor to approve.

Ownership and copyright of survey data resides with the aerodrome operator. To aid the Defence Geographic Centre (DGC) in the preparation of topographical charts and the obstacle database which has a general aviation safety benefit, all aerodrome survey data will be shared with DGC.

Chapter 9 - Bibliography

EASA

- European Regulation (EU) No. 139/2014 – requirements and administrative procedures related to aerodromes.
- European Regulation (EU) No. 73/2010 & 1029/2014 – requirements on the quality of aeronautical data and aeronautical information for the single European sky
- European Regulation (EU) No. 2017/373 - requirements for providers of air traffic management/air navigation services and other air traffic management network functions and their oversight.
- European Regulation (EU) No. 1035/2011 – Common Requirements for the Provision of Air Navigation Services.
- European Regulation (EC) No. 552/2004 – Interoperability of the European Air Traffic Management network.

ICAO

- Annex 4 to the Convention on International Civil Aviation – Aeronautical Charts.
- Annex 11 to the convention on International Civil Aviation – Air Traffic Services
- Annex 14 to the Convention on International Civil Aviation - Aerodrome Design and Operations.
- Annex 15 to the Convention on International Civil Aviation – Aeronautical Information Services.
- PANS AIM

Eurocontrol

- Terrain and Obstacle Data Manual
  This document is intended to be used by those bodies involved in the origination, processing and provision of electronic terrain and obstacle data, from the point at which the need for origination is identified, through to the point when the State makes it available in accordance with the requirements of ICAO Annex 15.

Civil Aviation Publications

- CAA Publication CAP 1054 Aeronautical Information Management
- CAA Publication CAP 738 Safeguarding of Aerodromes

Appendix 1 – Guidance on the content of Formal Arrangements between the Aerodrome Operator and the external organisation providing a survey of aeronautical data for the aerodrome.

To comply with Regulation (EU) 73/2010 (ADQ IR) Article 6 and CAP 1054 requirements for exchanging aeronautical information and data, the parties responsible for data in scope of the ADQ regulation, and any party handling such data and information, shall establish formal arrangements between themselves.

Such formal arrangements should include the following minimum content listed in ADQ regulation Annex IV part C and described in *EUROCONTROL Guidelines for Supporting the Implementation of Commission Regulation (EU) 73/2010*:

(a) the scope of aeronautical data or aeronautical information to be provided;

When establishing a formal arrangement for the provision of aeronautical data and information, it is essential that the arrangement precisely defines the scope of the aeronautical data and information that it covers.

This section should also include content of the Survey Package [see Chapter 2, point 2.8].

(b) the accuracy, resolution and integrity requirements for each data item supplied;

A formal arrangement for the provision of aeronautical data and information must define the quality requirements for the aeronautical data and information that will be passed between the signatories to the arrangement. Such an approach ensures that all parties have a common understanding of the levels of expectation. The data quality requirements for all aeronautical data and information that is included under the scope defined in point (a) must be referenced.

(c) the required methods for demonstrating that the data provided conforms with the specified requirements;

It must be demonstrated that aeronautical data and information meets the regulatory requirements at each stage of the process, aeronautical data and information which is not "fit for purpose" must not be passed on by any agency. The formal arrangement requires the documentation of all methods that shall be applied by the data provider to demonstrate this compliance.

The method applied should be mutually agreeable to both parties and, hence, form the standard against which aeronautical data and information may be verified by the recipient, if so desired.

The CAA recommends using the guidance material referenced in CAP 1054.

This section should also include content of the Survey Report [see Chapter 2, point 2.9].

(d) the nature of action to be taken in the event of discovery of a data error or inconsistency in any data provided;

In any data process, there is the possibility of a failure occurring and the mechanisms that should be used to identify, notify and correct failures in aeronautical data and information provision should be agreed and documented. It is also important that the parties are mutually aware of the impact of errors on the recipient's processes.

It is recommended that, at this point, escalation mechanisms are identified and agreed, such that if either party fails in their duties and responsibilities under the arrangement, that there is a common understanding of the steps that should be taken to alleviate failure, in a manner that is proportionate to the problem.

(e) the following minimum criteria for the notification of data changes:

— criteria for determining the timeliness of data provision based on the operational or safety significance of the change,

— any prior notice of expected changes,
— the means to be adopted for notification;

This requirement is for the establishment of dates, in advance of the effective date (of the data change), for differing aeronautical data and information, and for their inclusion within the formal arrangement.
It also establishes the need to document within the arrangement any notice of expected change, and the method by which the notification of change must be provided. This may assist those bodies further along the data chain to better plan the necessary resources to accommodate the change.
[Note: Data should be provided in advance of any agreed deadlines to allow sufficient time for the distribution of AIS products or other consequential amendments to aerodrome procedures and publications.]

(f) the party responsible for documenting data changes;

Ensures that where third-parties are involved in aeronautical data and information provision, that those parties who are involved in the formal arrangement are aware of their responsibilities. For example; it may be a surveyor that documents the changes needed, however, the formal arrangement may exist between the AIS and an Aerodrome Operator.

(g) the means to resolve any potential ambiguities caused where different formats are used to exchange aeronautical data or aeronautical information;

If aeronautical data and information is exchanged in different formats, this can lead to confusion and possible error. This requirement ensures that, although the use of different formats is not prohibited, the different formats are at least understood, and the means by which any ambiguities are resolved is documented as part of the arrangement.
Nonetheless, it is recommended that, in so far as is possible, the use of only one single, common format is agreed. Where this is not possible, it is recommended that that the use of a very limited set of formats is agreed.

(h) any limitations on the use of data;

A data provider may wish to place limitations on the use of the provided aeronautical data and information. This could be a result of the aeronautical data and information being considered suspect (of unknown or inferior quality) or for commercial reasons. An example of the latter case may be the provision of topographical information which is only to be used for the preparation of charts, and not for re-sale as topographical data.
Such limitations must be documented in the arrangement, such that all parties fully understand the limitations that apply to the aeronautical data and information provided.

(i) requirements for the production of quality reports by data providers to facilitate verification of data quality by the data users;

The formal arrangement should capture the need for the data provider to produce reports which can be used to verify the aeronautical data and information received. These reports could include:
1) Descriptions of the process used to validate the aeronautical data and information;
2) Reports of the results of the aeronautical data and information validation;
3) Any information provided to the data provider that supports the data which they have, in turn, utilised in the origination or validation processes.
This section should also include the minimum content of the Geodetic Connection Report – if required. [see Chapter 2, point 2.9].

(j) metadata requirements;

Metadata forms an essential element of the ADQ IR as it is necessary to fully understand the context of the aeronautical data and information. This requirement ensures that the formal arrangements established between a data provider and receiver fully documents the metadata that is expected to accompany the aeronautical data and information. The metadata requested should be in compliance with the dataset definitions contained in [ADQ IR] Annex I part C [and Tables included in CAP 1054 point 7.10].

(k) contingency requirements concerning the continuity of data provision.

The formal arrangements must include the execution plan to ensure the continued provision of aeronautical data and information in the event of a failing in the normal methodology for aeronautical data and

information provision. This contingency planning should address both institutional and technical aspects, for example:
1) The assignment of a deputy to approve aeronautical data and information in the event of the non-availability of the defined approval authority; or,
2) Secondary means for the delivery of aeronautical data and information when the planned means cannot be used as a result of a technical failure, for example.

Note:
Formal Arrangements should take account of guidance provided in CAP 1054.

Formal Arrangements can refer to other documents (i.e. regulations, guidance material or work instructions). All documents should be available to both parties.

The minimum requirements of a formal arrangement may form part of a contract, Letter of Agreement (LoA), Service Level Agreement (SLA), Memorandum of Understanding (MoU). Or, as a stand-alone Formal Arrangement covering the request and provision of an aeronautical information and data activity.

It is essential that Formal Arrangements and any referenced information, documentation and procedures are made available to the CAA on request.

Appendix 2 – eTOD & eTOD PLUS comparison table

Area	eTOD coverage area & obstacle collection surface	UK Policy ("eTOD PLUS")	Comments
Area 1	The entire territory of a State. The obstacle data shall be provided for obstacles in Area 1 higher than 100 m above ground.	The entire territory of a State. The obstacle data shall be provided for obstacles in Area 1 higher than 100 m above ground.	UK En-route Obstacle Dataset is available in UK AIP – ENR 5.4. Details of how electronic terrain and obstacle data may be obtained are published in UK AIP GEN 3.1.6.
Area 2a	The rectangular area around a runway that comprises of the runway strip plus any clearway that exists. Area 2a obstacle collection surfaces shall have height of **3 m** above the nearest runway elevation measured along the runway centre line, and for those portions related to a clearway, if one exists, at the elevation of the nearest runway end.	The rectangular area around a runway that comprises of the runway strip plus any clearway that exists. Area 2a obstacle collection surfaces shall have height of **0.5 m** above the nearest runway elevation measured along the runway centre line, and for those portions related to a clearway, if one exists, at the elevation of the nearest runway end.	All objects which extend to a **height of 0.5 m or more** above ground in Area 2a will be collected.
Area 2b	The area extending from the ends of Area 2a in the direction of departure, with a length of 10 km and a splay of 15% to each side. The Area 2b obstacle collection surface has a 1.2% slope extending from the ends of Area 2a at the elevation of the runway end in the direction of departure, with a length of 10 km and a splay of 15% to each side. **Obstacles less than 3 m in height above ground need not be collected.**	The area extending from the ends of Area 2a in the direction of departure, with a length of 10 km and a splay of 15% to each side. The area 2b obstacle collection surface has a 1.2% slope extending from the ends of Area 2a at the elevation of the runway end in the direction of departure, with a length of 10 km and a splay of 15% to each side. **Obstacles less than 0.5 m in height above ground need not be collected. For aerodrome reference codes 3 and 4, the extent of the Area 2b should be increased to 15.0 km (8 NM) to support the application of OLS. The obstacle collection surface should be horizontal beyond a distance of 10 km to cover the**	All objects which extend to a **height of 0.5 m** or **more** above ground in the Area 2b which project above a plane surface having a 1.2 % slope will be collected. Additionally, for aerodrome reference codes 3 and 4, the extent of the Area 2b will be increased to 15.0 km (8 NM) to support the application of OLS. **The eTOD PLUS Area 2b obstacle collection surface should be horizontal beyond a distance of 10 km to cover the horizontal section of the Approach Surface (OLS).** Therefore, 10 km from the edge of Area 2a, eTOD PLUS Area 2b includes a step from 120 m

		horizontal section of the Approach Surface (OLS). **All objects of a height of 100 m AGL or more should be collected.**	to 150 m above the threshold elevation.
Area 2c	The area extending outside Area 2a and Area 2b at a distance of not more than 10 km from the boundary of Area 2a.Area 2c obstacle collection surface has a 1.2% slope extending outside Area 2a and Area 2b at a distance of not more than 10 km from the boundary of Area 2a. The initial elevation of Area 2c shall be the elevation of the point of Area 2a at which it commences. Obstacles less than 15 m in height above ground need not be collected	The area extending outside Area 2a and Area 2b at a distance of not more than 10 km from the boundary of Area 2a. Area 2c obstacle collection surface has a 1.2% slope extending outside Area 2a and Area 2b at a distance of not more than 10 km from the boundary of Area 2a. **For parts of the Area 2c where the inner horizontal and conical obstacle limitation surfaces are more demanding (outer edge of the Inner Horizontal Surface and the inner edge of the Conical Surface), the survey should cover the most demanding (lower) surfaces.** **For aerodrome reference codes 3 and 4, the extent of the Area 2c should be increased to 15.0 km (8 NM) to support the application of OLS. The obstacle collection surface should be horizontal beyond a distance of 10 km to cover the Outer Horizontal Surface.** **All objects of a height of 100 m AGL or more should be collected.** The initial elevation of Area 2c shall be the elevation of the point of Area 2a at which it commences. **Obstacles less than 3 m in height above ground need not be collected.**	The Aerodrome Operator/Surveyor will need to identify the areas where the Inner Horizontal and Conical Obstacle Limitation Surfaces are more demanding than eTOD area 2c and collect the relevant obstacles to support the application of OLS. **The survey should always cover the most demanding (lower) surfaces.** All objects of a height of 100 m AGL or more should be collected.
Area 2d	The area outside Areas 2a, 2b and 2c up to a distance of 45 km from the aerodrome reference point, or to an existing TMA boundary,	The area outside Areas 2a, 2b and 2c up to a distance of 45 km from the aerodrome reference point, or to an existing TMA boundary, whichever is nearest.	This data is included in the Area 1 dataset provided by Defence Geographic Centre (DGC) and published in AIP ENR 5.4. Data taken from

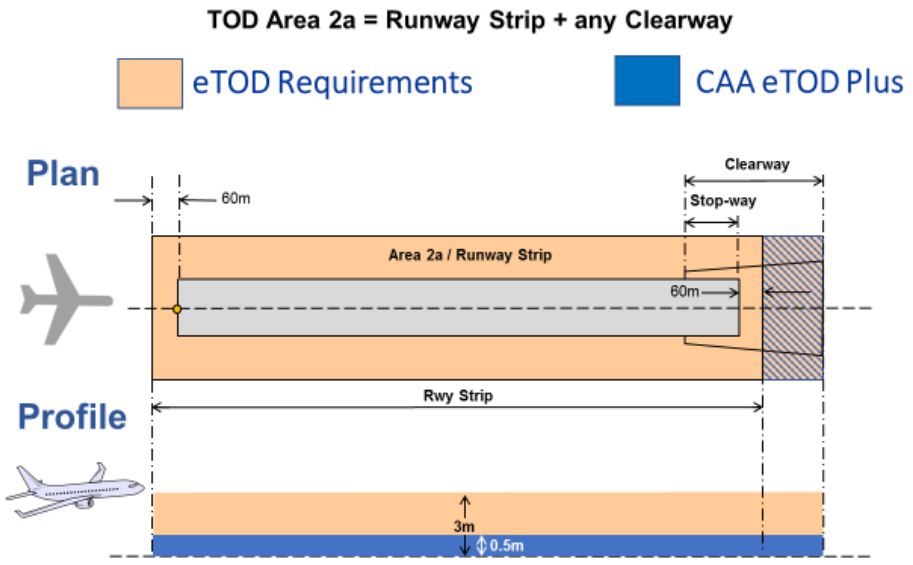
	whichever is nearest. The Area 2d obstacle collection surface has a height of 100 m above ground level.	The Area 2d obstacle collection surface has a height of 100 m above ground level.	Area 1 dataset can be processed by surveyor and provided to Area 2d numerical requirements. As DGC is demonstrating continuous improvement of data processes and procedures used to deliver en-route obstacle data, **aerodrome operators are able to filter obstacle data from Area 1 dataset and add it to Area 2 dataset (AD 2.10) and any other relevant dataset with an annotation to indicate what is the source of this data**. If necessary, this approach may be revised in the future (i.e. when other data sources are available).
Area 3	The area bordering an aerodrome movement **area that extends horizontally from the edge of a runway to 90 m from the runway centre line and 50 m from the edge of all other parts** of the aerodrome movement area. The data collection surface for terrain and obstacles extends a half-metre (0.5 m) above the horizontal plane passing through the nearest point on the aerodrome movement area.	The area bordering an aerodrome movement area **that comprises the runway strip plus any clearway that exists (identical to Area 2a) and extends 50 m from the edge of all other parts** of the aerodrome movement area. The data collection surface for terrain and obstacles extends a half-metre (0.5 m) above the horizontal plane passing through the nearest point on the aerodrome movement area.	Area 3 will cover Area 2a and extend 50 m from the edge of taxiways and aprons. Any terrain or obstacles whose elevation is 0.5m or greater than the elevation of the nearest point on the movement area should be collected. This results in data being collected for only those “islands” where this surface has been penetrated. No data is collected within the Area 3 data set for other objects or terrain which exist below this assessment surface.
Area 4	The area extending 900 m prior to the runway threshold and 60 m each side of the extended runway centre line in the direction of the approach on a precision approach runway, Category II or III.	The area extending 900 m prior to the runway threshold and 60 m each side of the extended runway centre line in the direction of the approach on a precision approach runway, Category II or III.	Identical. The geographical scope of Area 4 matches that of the PATC. As identified by Annex 4 for PATC – all objects of a height of 3 m and more above the centre line profile should be collected (and

			included in obstacle datasets) as a minimum.
Numerical requirements	Terrain and obstacle data in Areas 2-4 shall comply with the numerical requirements specified in the ICAO Data Catalogue (PANS-AIM Appendix 1).	Terrain and obstacle data in Areas 2-4 shall comply with the numerical requirements specified in the ICAO Data Catalogue (PANS-AIM Appendix 1).	Identical.

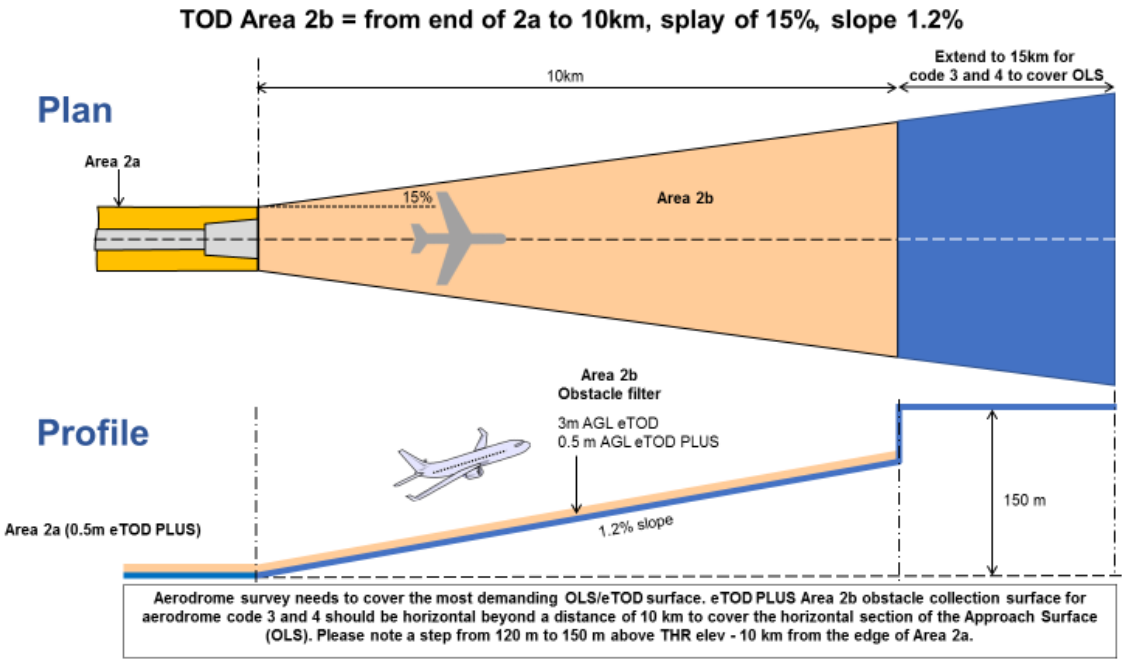
Appendix 3 – When OLS is more demanding than eTOD Area 2c.

- All aerdromes with reference code 3 & 4 and all aerodromes with precision approaches have areas where Obstacle Limitation Surfaces are more demanding than eTOD Area 2c.
- eTOD PLUS Area 2c obstacle collection surface should always cover the most demanding obstacle limitation surfaces.
- Any issues with application of the most demanding surfaces can be consulted with the CAA Airspace Regulation.

Appendix 4 – eTOD & eTOD PLUS graphical representation

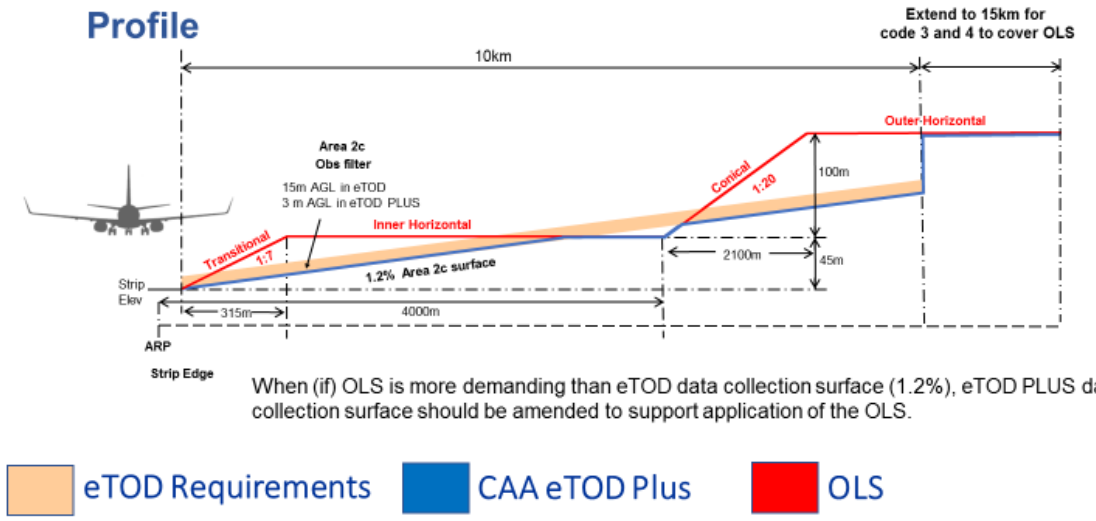


Reduction of eTOD 3m height requirement to ensure clearway is free of significant obstacles



Aerodrome survey needs to cover the most demanding OLS/eTOD surface. eTOD PLUS Area 2b obstacle collection surface for aerodrome code 3 and 4 should be horizontal beyond a distance of 10 km to cover the horizontal section of the Approach Surface (OLS). Please note a step from 120 m to 150 m above THR elev - 10 km from the edge of Area 2a.

TOD Area 2c = 10km at 1.2% slope from 2a (15km for code 3 & 4).



When (if) OLS is more demanding than eTOD data collection surface (1.2%), eTOD PLUS data collection surface should be amended to support application of the OLS.

eTOD Requirements CAA eTOD Plus OLS

Appendix 5 – Digital Data Specification

Data Delivery format

The following fields describe the data format layout and should be used as a guideline to report data. Fields not applicable should be left blank.

Master files of all surveyed facilities and obstacles shall be created and supplied. Runway and declared distance files should be created and supplied.

Files shall be in the form of a comma delimited ASCII text file containing all fields plus CRCV field as listed below.

Special Notes:

- Enumerated values shall be strictly adhered to.
- Decimal places shall not be rounded and leading zeros for numerical values are not required.
- Characters are currently restricted to ISO 8859-17, no commas or backslashes are to be used within fields.
- All text other than TEXT REMARK shall be upper case.

Common File Header

Each file in Survey Package shall contain metadata on the first rows of the file. Each row shall contain an attribute name as listed exactly below followed by a colon and a populated value.

Row	Attribute Name	Description
1	DataOriginator	Name of the person responsible for the submitted version of the file.
2	DataOriginatorCompany	Name of the company responsible for data origination
3	DataOriginatorPhone	Contact phone number of the person/company responsible for data origination
4	DataOriginatorAddressNumber	House/Building number of the person/company responsible for data origination
5	DataOriginatorAddressStreet	Street name of the person/company responsible for data origination
6	DataOriginatorAddressCity	City of the person/company responsible for data origination
7	DataOriginatorAddressCountry	Country of the person/company responsible for data origination
8	DataOriginatorAddressPostalCode	Post code of the person/company responsible for data origination
9	DataOriginatorElectronicMailAddress	e-mail address of the person/company responsible for data origination
10	AerodromeIdent	ICAO Aerodrome Location Indicator
11	SurveyCAP1668Compliant	Yes the survey is CAP1668 compliant
12	SurveyRevision	A revision number/letter incremented for subsequent submissions of the same survey
13	SurveyProcessDate	The date on which the submitted version of the file was created.
14	FileCreator	Name of the last person who interacted with the data and created the survey file.
15	EarthReferenceModel	Earth Reference Model used.
16	CoordinateSystem	Co-ordinate System used.

17	ConfidenceLevel	The probability [%] that the true value of a parameter is within a certain interval around the estimate of its value. This means that for X% of the measured values, their difference to the truth does not exceed the specified accuracy requirement.

Aerodrome facilities file

(named appropriately egxx_ad00.crc - "egxx" is the ICAO indicator code for the surveyed aerodrome and "00" is the year of the survey.)

All fields shall be populated with the exception of Field 3, Field 4 and Field 10, which must be blank if there is no identification, association or description (Duplicate data in a record is not acceptable).

To be entered in field Description

Field 1	SITE NAME	XXXX	ICAO Aerodrome Location Indicator.
Field 2	TYPE OF FEATURE	For allowable values refer to Table 1 below.	
Field 3	IDENTIFICATION	For required formatting refer to Table 1 below.	
Field 4	ASSOCIATION	For required formatting refer to Table 1 below.	
Field 5	LATITUDE	DDMMSS.ssssN/S	WGS-84 Latitude in DEG, MIN, SEC, 1/10000's SEC.
Field 6	LONGITUDE	DDMMSS.ssssE/W	WGS-84 Longitude in DEG, MIN, SEC, 1/10000's SEC.
Field 7	ELLIPSOIDAL HEIGHT (M)	000.00	Elevation in metres above WGS-84 ellipsoid to 2 decimal places.
Field 8	ELLIPSOIDAL HEIGHT (FT)	000.00	Elevation in feet above WGS-84 ellipsoid to 2 decimal places.
Field 9	LIT OR UNLIT	Y/N	Y To be entered if facility is lit. N To be entered if facility is unlit.
Field 10	LIGHTING DESCRIPTION	FLASHING WHITE	A textual description of the lighting used.
Field 11	MOBILE	Y/N	Y To be entered if the feature is mobile. N To be entered if the feature is not mobile.
Field 12	FRANGIBLE	Y/N	Y To be entered if the feature is frangible. N To be entered if the feature is not frangible.
Field 13	CONSTRUCTION STATUS	IN_CONSTRUCTION COMPLETED DEMOLITION_PLANNED IN_DEMOLITION	In Construction. Completed. Removal is planned. Work in progress to remove the item.
Field 17	VERTICAL REFERENCE SYSTEM	NEWLYN	Text description of the tide gauge used to determine MSL.

Field 18	ORTHOMETRIC HEIGHT (M)	0000.00	Elevation in metres AMSL to 2 decimal places.
Field 19	ORTHOMETRIC HEIGHT (FT)	0000.00	Elevation in feet AMSL to 2 decimal places.
Field 20	HEIGHT ABOVE GROUND LEVEL (M)	0000.00	Height above ground level in meters to 2 decimal places
Field 21	HEIGHT ABOVE GROUND LEVEL (FT)	0000.00	Height above ground level in feet to 2 decimal places
Field 24	HORIZONTAL EXTENT (M)	000	Horizontal Extent (radius) of the surveyed entity to the nearest metre.
Field 25	HORIZONTAL ACCURACY (M)	00.00	Horizontal Accuracy in Meters relative to the aerodrome control network to 2 decimal places at a 95% confidence level.
Field 26	VERTICAL ACCURACY (M)	00.00	Vertical Accuracy in Meters relative to the aerodrome control network to 2 decimal places at a 95% confidence level.
Field 27	RECORD IDENTIFIER	0000	Unique integer number.
Field 28	SURVEY DATE	dd/mm/yy	Date of field survey of record.
Field 29	CRVC		32 bit CRC-32Q algorithm Value (CRCV format = Hexadecimal).

Table 1

Field 2		Field 3	Example	Rule	Field 4	Example	Rule
TYPE OF FEATURE	**DESCRIPTION**	**IDENTIFICATION**			**ASSOCIATION**		
ARP	Aerodrome Reference Point				For allowable values refer to Table 2.		
AEP(1)	Aerodrome Elevation Point				For allowable values refer to Table 2.		
ABN	Aerodrome Beacon				For allowable values refer to Table 2.		
ANEMOMETER	Anemometer				For allowable values refer to Table 2.		
APAPI	Abbreviated Precision Approach Path Indicator				(RWY DIR)	05	1
ASDA_END	End of ASDA				(RWY DIR)	05	1
ATC	Air Traffic Control Tower				For allowable values refer to Table 2.		
CADF	Commutated Aerial Direction Finder				For allowable values refer to Table 2.		
CENTRE_PT_TWY	Taxiway Centre-line Point	IDENT	ABC	3	(TAXIWAY)	W	5
CHECK_PT_RWY	Runway Check Point	IDENT	ABC	3	(RWY) Alphanumeric	05/23	2
DME	Distance Measuring Equipment	IDENT	ABC	3	For allowable values refer to Table 2.		
DME_ILS	Instrument Landing System Distance Measuring Equipment	IDENT	ABC	3	(LLZ IDENT)	IABC	3
DME_MLS	Microwave Landing System Distance Measuring Equipment	IDENT	ABC	3	(MLS_AZM IDENT)	ABC	3
DRDF	Digital Resolution Direction Finder				For allowable values refer to Table 2.		
FATO	Final Approach and Take-Off Area				(FATO DIR)	05	1
GP	Instrument Landing System Glide Path	IDENT	IABC	3	(RWY DIR)	05	1
GP_MON	Glide Path Monitor				(RWY DIR)	05	1
HOLD	Taxiway Holding Point	Alphanumeric	123A	4	(TAXIWAY)	w	5
HOLD_STOP_BAR	Taxiway Holding Point Stop Bar Lights	Alphanumeric	123A	4	(TAXIWAY)	w	5
IBN	Identification Beacon				For allowable values refer to Table 2.		
IRVR	Instrument Runway Visual Range						

L	Locator (NDB)	IDENT	ABC	3	For allowable values refer to Table 2.		
LDA_END	End of LDA				(RWY DIR)	05	1
LLZ	Instrument Landing System Localizer	IDENT	IABC	3	(RWY DIR)	05	1
LLZ_MON	Instrument Landing System Monitor				(RWY DIR)	05	1
MLS_AZM	Microwave Landing System Azimuth	IDENT	ABC	3	(RWY DIR)	05	1
MLS_ELEV	Microwave Landing System Elevation	IDENT	ABC	3	(RWY DIR)	05	1
MM	Middle Marker	IDENT	-_--	7	For allowable values refer to Table 2.		
NDB	Non-Directional Beacon	IDENT	ABC	3	For allowable values refer to Table 2.		
OM	Outer Marker	IDENT	-_--	7	For allowable values refer to Table 2.		
PAPI	Precision Approach Path Indicator				(RWY DIR)	05	1
RADAR	Radar				For allowable values refer to Table 2.		
RADAR_MSSR	Monopulse Secondary Surveillance Radar				For allowable values refer to Table 2.		
RADAR_PAR	Precision Approach Radar				For allowable values refer to Table 2.		
RADAR_SSR	Secondary Surveillance Radar				For allowable values refer to Table 2.		
RADAR_WATCHMAN	Watchman Radar				For allowable values refer to Table 2.		
ROP	Runway Observation Post				For allowable values refer to Table 2.		
STAND	Parking Stand	Alphanumeric	123A	4	(APRON)	MAIN	6
TACAN	Tactical Air Navigation Aid	IDENT	ABC	3	For allowable values refer to Table 2.		
TDZE	Touch Down Zone Elevation				(RWY DIR)	05	1
THR	Threshold				(RWY DIR)	05	1
TLOF	Touch Down and Lift off Area	Alphanumeric	123A	4	For allowable values refer to Table 2.		
TODA_END	End of TODA				(RWY DIR)	05	1
TORA_END	End of TORA				(RWY DIR)	05	1
TORA_START	Start of TORA				(RWY DIR)	05	1

VDF	Very High Frequency Direction Finding Station				For allowable values refer to Table 2.
VHF_RX	Very High Frequency Receiver				For allowable values refer to Table 2.
VHF_TX	Very High Frequency Transmitter				For allowable values refer to Table 2.
VOR	Very High Frequency Omni-Directional Radio Range	IDENT	ABC	3	For allowable values refer to Table 2.
VOR/DME	Very High Frequency Omni-Directional Range paired with Distance Measuring Equipment	IDENT	ABC	3	For allowable values refer to Table 2.
WINDSOCK	Windsock				For allowable values refer to Table 2.
OTHER: (2)	Other Aerodrome Feature				For allowable values refer to Table 2.

Rules:

1. The full textual designator of the landing and take-off direction. Must have between 2 and 3 characters, of which the first 2 may be only digits, which indicate an integer value between 01 and 36, inclusive. Examples: 09, 09L, 09R, 09C, 09T, etc.
2. The full textual designator of the runway, used to uniquely identify it at an aerodrome/heliport which has more than one. Must be between 1 and 16 characters in length. Examples 09/27, 02R/20L, RWY 1.
3. The Alphanumeric coded identification of the radio navigation aid. Must be between 1 and 4 characters in length.
4. The textual designator of the gate/stand or hold. Must be between 1 and 16 characters in length. Examples 13, 84A, etc.
5. The textual designator of the taxiway. Must be between 1 and 16 characters in length
6. The full textual name or designator used to identify an apron. Must be between 1 and 60 characters in length
7. The coded identification of the marker. The only allowable characters are '.' (#002E) and '-' (#002D). For example, '-.-' meaning 'dash-dot-dash', '-' meaning 'dashes', etc.

(1) AEP - (Aerodrome Elevation Point) the highest point of the landing area.

(2) For all surveyed entities which are not listed in Table 1 but are essential for operational reasons to be listed in the Aerodrome facilities file, type OTHER must be used followed by a colon and its description (up to 32 characters).Eg. STOP_LIGHT becomes OTHER:STOP_LIGHT

These entities will be handled as obstacles and therefore require an association with Table 2 Field 4.

Table 2

Field 2 - TYPE OF FEATURE	
VALUES	**DESCRIPTION**
AG_EQUIP	NAVAID
ANTENNA	NUCLEAR_REACTOR
ARCH	POLE
BRIDGE	POWER_PLANT
BUILDING	REFINERY
CABLE_CAR	RIG
CATENARY	SALTWATER_SYSTEM
COMPRESSED_AIR_SYSTEM	SIGN
CONTROL_MONITORING_SYSTEM	SPIRE
CONTROL_TOWER	STACK
COOLING_TOWER	STADIUM
CRANE	STORM_SYSTEM
DAM	TANK
DOME	TETHERED_BALLOON
ELECTRICAL_EXIT_LIGHT	TOWER
ELECTRICAL_SYSTEM	TRAMWAY
ELEVATOR	TRANSMISSION_LINE
FENCE	TREE
FUEL_SYSTEM	URBAN
GATE	VEGETATION
GENERAL_UTILITY	WALL
GRAIN_ELEVATOR	WASTEWATER_SYSTEM
HEAT_COOL_SYSTEM	WATER_SYSTEM
INDUSTRIAL_SYSTEM	WATER_TOWER
LIGHTHOUSE	WINDMILL
MAST	WINDMILL_FARMS
MONUMENT	OTHER
NATURAL_GAS_SYSTEM	
NATURAL_HIGHPOINT	
Field 4 - ASSOCIATION	
VALUES	**DESCRIPTION**
AREA1	ICAO Area 1: entire territory of a State.
AREA2	ICAO Area 2: terminal control area.
AREA3	ICAO Area 3: aerodrome/heliport movement area
AREA4	ICAO Area 4: Category II or III operations area.

Master obstacles file
(named appropriately egxx_obst00.crc - "egxx" is the ICAO indicator code for the surveyed aerodrome and "00" is the year of the survey)

All fields shall be populated (Duplicate data in a record is not acceptable).

To be entered in field Description

Field 1	SITE NAME	XXXX	ICAO Aerodrome Location Indicator.
Field 2	TYPE OF FEATURE	For allowable values refer to Table 2.	
Field 3	IDENTIFICATION	CRASH BARRIER 3	A full textual description of the type of obstacle to supplement Field 2.
Field 4	ASSOCIATION	For allowable values refer to Table 2.	
Field 5	LATITUDE	DDMMSS.ssssN/S	WGS-84 Latitude in DEG, MIN, SEC, 1/10000's SEC.
Field 6	LONGITUDE	DDMMSS.ssssE/W	WGS-84 Longitude in DEG, MIN, SEC, 1/10000's SEC.
Field 7	ELLIPSOIDAL HEIGHT (M)	000.00	Elevation in metres above WGS-84 ellipsoid to 2 decimal places.
Field 8	ELLIPSOIDAL HEIGHT (FT)	000.00	Elevation in feet above WGS-84 ellipsoid to 2 decimal places.
Field 9	LIT OR UNLIT	Y/N	Y To be entered if facility is lit. N To be entered if facility is unlit.
Field 10	LIGHTING DESCRIPTION	FLASHING WHITE	A textual description of the lighting used
Field 11	MOBILE	Y/N	Y To be entered if the feature is mobile. N To be entered if the feature is not mobile.
Field 12	FRANGIBLE	Y/N	Y To be entered if the feature is frangible. N To be entered if the feature is not frangible.
Field 13	CONSTRUCTION STATUS	IN_CONSTRUCTION COMPLETED DEMOLITION_PLANNED IN_DEMOLITION	In Construction. Completed. Removal is planned. Work in progress to remove the item.
Field 17	VERTICAL REFERENCE SYSTEM	NEWLYN	Text description of the tide gauge used to determine MSL.
Field 18	ORTHOMETRIC HEIGHT (M)	0000.00	Elevation in metres AMSL to 2 decimal places.
Field 19	ORTHOMETRIC HEIGHT (FT)	0000.00	Elevation in feet AMSL to 2 decimal places.
Field 20	HEIGHT ABOVE GROUND LEVEL (M)	0000.00	Height above ground level in meters to 2 decimal places.
Field 21	HEIGHT ABOVE GROUND LEVEL (FT)	0000.00	Height above ground level in feet to 2 decimal places.
Field 24	HORIZONTAL EXTENT (M)	000	Horizontal Extent (radius) of the surveyed entity to the nearest metre.
Field 25	HORIZONTAL ACCURACY (M)	00.00	Horizontal Accuracy in Meters relative to the aerodrome control network to 2 decimal places at a 95% confidence level.
Field 26	VERTICAL ACCURACY (M)	00.00	Vertical Accuracy in Meters relative to the aerodrome control network to 2

			decimal places at a 95% confidence level.
Field 27	RECORD IDENTIFIER	0000	Unique integer number
Field 28	SURVEY DATE	dd/mm/yy	Date of field survey of record
Field 29	CRVC		32 bit CRC-32Q algorithm Value (CRCV format = Hexadecimal)

Runway and Declared Distance file
(named appropriately egxx_Rdd00.crc - "egxx" is the ICAO indicator code for the surveyed aerodrome and "00" is the year of the survey)

All fields shall be populated with the exception of Field 4 and Field 7, which must be blank if there is no taxiway association or text remark (Duplicate data in a record is not acceptable).

To be entered in field Description

Field 1	SITE NAME	XXXX	ICAO Aerodrome Location Indicator.
Field 2	TYPE OF FEATURE	For allowable values refer to Table 3 below.	
Field 3	RUNWAY/FATO ASSOCIATION	For required formatting refer to Table 1 Field 4 (RWY DIR)/ (FATO DIR) and Rule 1 (Rules to be found below the Table 1).	
Field 4	TAXIWAY ASSOCIATION	For required formatting refer to Table 1 Field 4 (TAXIWAY) and Rule 5 (Rules to be found below the Table 1).	
Field 5	DISTANCE (M)	0000.00	The value of the declared distance in meters.
Field 6	ACCURACY (M)	00.0000	
Field 6	PERIOD OF THE DAY WHEN THE DECLARED DISTANCE IS VALID	D N A OTHER	Day Night Day and night OTHER
Field 7	TEXT REMARK	Aa0	Free text remark
Field 8	DATE	dd/mm/yy	Date of measurement or calculation of the distance.
Field 9	CRVC		32 bit CRC-32Q algorithm Value (CRCV format = Hexadecimal).

Table 3

Field 2	Description
RWY_LEN	Runway length
RWY_WID	Runway width
STRIP_LEN	Strip length
STRIP_WID	Strip width
FATO_LEN	FATO area length
FATO_WID	FATO area width
SWY_LEN	Stopway length
SWY_WID	Stopway width
CWY_LEN	Clearway length
CWY_WID	Clearway width
LDA	Landing Distance Available
TORA	Take-Off Run Available
TODA	Take-Off Distance Available
ASDA	Accelerate-Stop Distance Available
DPLM	Threshold Displacement
TODAH	Take-Off Distance Available for helicopters
RTODAH	Rejected Take-Off Distance Available for Helicopters
LDAH	Landing Distance Available for Helicopters
OTHER	