CIVIL AVIATION AUTHORITY
OF NEW ZEALAND

Advisory Circular
AC 139-9

Revision 2

27 April 2007

Notification of aerodrome data and information

General

Civil Aviation Authority advisory circulars (AC) contain information about standards, practices and procedures that the Authority has found to be acceptable for compliance with the associated rule.

Consideration will be given to other methods of compliance which may be presented to the Authority.

When new standards, practices or procedures are found to be acceptable they will be added to the appropriate advisory circular.

In addressing a subject the use of the imperative “must”, “require” or “is to” terms not normally welcome in an AC, is because they are associated with mandatory provisions of the Rule itself.

Each reference to a number in this AC, such as 139.15, is a reference to a specific rule within Part 139.

Purpose

This Advisory Circular (AC) provides methods acceptable to the Authority for showing compliance with the requirements for the notification of aerodrome data and information in Part 139 of the Civil Aviation Rules (CAR).

Focus

This material is intended for the holder of an aerodrome operating certificate issued under Part 139 and any other aerodrome operator who wishes to promulgate aerodrome data and information in the aeronautical information publication (AIP).

Related Rules

This AC relates specifically to CAR Part 139, Rule 139.71 Notification of aerodrome data and information and Rule 139.123 Aerodrome condition notification.

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Authorised by
Manager Rules Development

Change Notice

Revision 2 re-formats and re-numbers this advisory circular from AC 139-09A to AC 139-9 as part of a project to standardise the numbering of all ACs. References to NZ datum 1949 have also been changed to the WGS84 datum. The mailing address for the CAA that is provided in 4.1 has also been updated.

Table of Contents

INTRODUCTION

1 Requirement to promulgate aeronautical information

Under Annex 15 to the Convention, Aeronautical Information Services, the State is required to publish or arrange for the publication of aeronautical information that is essential to air navigation. This aeronautical information is promulgated by the Aeronautical Information Service (AIS) which is operated by the Airways Corporation of New Zealand Limited on behalf of the Civil Aviation Authority (CAA). The promulgated aeronautical information includes aerodrome data and information and various aerodrome charts.

2 Purpose of promulgating aerodrome data and information

2.1 Before any person may use any place as an aerodrome for air transport operations, they must:

(a) ensure that the place has physical characteristics, obstacle limitation surfaces, and visual aids commensurate with the characteristics of the aeroplane being used, the lowest meteorological minima to be used, and the ambient light conditions; and

(b) ensure that the place is suitable for landing and taking-off; and

(c) employ a checking system to determine that the condition of the aerodrome is safe for that operation.

2.2 These requirements are part of the requirements prescribed in Civil Aviation Rules (CAR) Part 139, Subpart E, Use of aerodromes, which comes into effect on 6 January 1993.

2.3 To enable air transport operators, both international and domestic, to assess the suitability and condition of an aerodrome for their aircraft operations, the Aeronautical Information Service is required to publish aerodrome data and information in the New Zealand Aeronautical Information Publication (AIPNZ) and to promulgate any significant change to that data or information by NOTAM where the change is of direct significance to the operation of aircraft. The aircraft operator can rely on the currency and accuracy of the data and information published in the AIPNZ and promulgated by NOTAM to meet the applicable requirements of CAR Part 139, Subpart E, to determine the suitability and condition of an aerodrome for their operation.

3 Types of published aerodromes

3.1 Certificated and licensed aerodromes. Verified data and information on all certificated or licensed aerodromes must be published by the AIS in the AIPNZ. Operationally significant changes to that data and information must be promulgated by NOTAM as applicable.

3.2 Non-certificated aerodromes. Verified data and information on non-certificated or unlicensed aerodromes may be published by the AIS in the AIPNZ provided the aerodrome operator complies with the criteria listed in paragraph 4.3. Operationally significant changes to that data and information must be promulgated by NOTAM as applicable.

4 Procedure for promulgation

The procedure for the promulgation of aerodrome data and information in the AIPNZ and by NOTAM is:

4.1 Licensed aerodromes (not applicable after 6 January 1994). Licensees are to forward aerodrome data and information that is required to be published in the AIPNZ to the CAA.

Mailing address : Civil Aviation Authority of New Zealand,
10 Hutt Road

P O Box 31441
Lower Hutt 6315

Telephone : 0-4-560 9400

Facsimile : 0-4-569 2024

AFTN : NZHOYAYI

The Licensee remains responsible under Regulation 185 for advising the Director or the nearest Air Traffic Services unit by the fastest means available, of any significant change in the state of the manoeuvring area or facilities related to the aerodrome which may constitute a hazard to the safety of operating aircraft. Such advice is required for the issue of a NOTAM.

4.2 Certificated aerodromes. Holders of aerodrome operating certificates are to forward aerodrome data and information that is required to be published in the AIPNZ to the AIS.

Mailing address : Aviation Publishing
Airways Corporation of New Zealand
44-48 Willis Street
P O Box 294
Wellington 6015

Telephone : 0800–500 045 (Toll free)

Facsimile : 0800–686 867 (Toll free)

Telephone : 0-4-471 1899

Facsimile : 0-4-471 5813

Holders of aerodrome operating certificates are required under Part 139 to:

(a) establish any limitations on the use of the aerodrome that arise from the aerodrome design or the facilities or services provided at their aerodrome;

(b) notify the AIS of the aerodrome data and information that is specified in this AC for publication in the AIPNZ; and

(c) notify the AIS without delay of any aerodrome operational condition or defect at their aerodrome that may affect the safe operation of aircraft. Such notification is required for the issue of a NOTAM.

The certificate holder is responsible for —

(a) the accuracy and timeliness of the aerodrome data and information forwarded to AIS for promulgation; and

(b) maintaining the currency of that data and information and notifying any changes, including changes to the operational data and status of the aerodrome, to the AIS.

4.3 Non-certificated published aerodromes. Data and information on non-certificated aerodromes may be published in the AIPNZ provided the aerodrome operator provides the AIS with —

(a) their name, address, telephone and facsimile numbers as applicable for publication in the AIPNZ; and

(b) the name and contact details, for publication in the AIPNZ, of the person who will be responsible for:

(i) establishing any operational conditions or limitations on the use of the aerodrome that arise from the aerodrome design or the facilities or services provided at the aerodrome; and

(ii) notifying the AIS of the aerodrome data and information specified in this AC for publication in the AIPNZ; and

(iii) the accuracy and timeliness of that data and information forwarded to AIS for promulgation; and

(iv) notifying the AIS of any changes to the aerodrome data and information including any changes to the runway declared distances or effective operational lengths (EOL); and

(v) notifying the AIS without delay of any condition or defect at their aerodrome that may affect the safe operation of aircraft. Such notification is required for the issue of a NOTAM; and

(vi) providing the AIS with an annual declaration that the aerodrome data and information published in the AIPNZ for their aerodrome is accurate; and

(c) a declaration that the person nominated in (b) has the capability and will undertake the responsibilities detailed in (b); and

(d) a statement about the availability of the aerodrome, that is, "Public use" meaning available for general use without the prior agreement of the aerodrome operator, or "Private use", meaning available only with the prior agreement of the aerodrome operator.

All data and information forwarded to the AIS for promulgation must be accompanied by a declaration signed by the person nominated in paragraph (b) stating that the data and information is accurate.

The aerodrome data and information will be deleted from the AIPNZ if the aerodrome operator or the nominated person fails to provide the AIS with the required information and declarations or if the nominated person fails to notify the AIS of any changes to the aerodrome data and information including significant changes that should have been promulgated by NOTAM.

5 Data and information to be notified

The aerodrome data and information to be provided to the AIS for publication in the AIP is:

(a) for International aerodromes as listed in ICAO Annex 15, Appendix 1, paragraph 2.2; and

(b) for domestic aerodromes as listed in Appendix 1 of this AC.

6 Runway effective operational lengths

The most critical data to be provided to the AIS for promulgation is the runway EOL based on the design take-off climb and approach obstacle limitation surfaces. The safe operation of aircraft is dependent on the accuracy of the promulgated runway EOL. Appendix 2 of this AC provides guidance and methods for establishing the EOL for runways serving aeroplanes at or below 5700 kilograms MCTOW. The EOL for other runways should be calculated using surveyed data to identify any obstructions that have to be taken into account.

7 Aerodrome obstacle information

7.1 Under ICAO Annex 4, Aeronautical Charts, the state (CAA) is required to ensure the availability of aerodrome obstacle information to enable aircraft operators to comply with the operating limitations of their aircraft.

7.2 Significant obstacles in the take-off flight path area of runways regularly used by international civil aviation and any runways regularly used by Group A aeroplanes must be published by AIS as part of the AIP. Group A aircraft are those defined in CASO 4, Part 1 as being "aeroplanes capable of continued flight in IMC after failure of a critical engine at speed V_1 and proceeding to a suitable aerodrome for landing."

7.3 The aerodrome operator is responsible for providing or arranging for the provision of the necessary surveyed aerodrome obstacle data to the AIS. The survey should be conducted prior to commissioning any runway serving any Group A aircraft and thereafter at least every five years.

7.4 The aerodrome operator must notify the AIS if there are no significant obstacles in the take-off flight path area of a runway.

7.5 Appendix 3 of this AC contains survey instructions and data required to be provided to the AIS for the promulgation of obstacle information.

8 Control of obstacles

8.1 The effective use of an aerodrome may be influenced by natural features, trees and man–made objects inside and outside the aerodrome boundary. These may result in limitations on:

(a) the distances available for take-off and landing;

(b) the meteorological minima for take-off and landing; and

(c) the payload of some aircraft types.

8.2 The extent of the limitation depends on individual circumstances, but it is possible to significantly reduce the payload penalty by judicious obstacle removal and obstacle control.

8.3 AC 139-10 Control of Obstacles provides advice on measures that can be taken to protect the aerodrome design obstacle limitation surfaces, the take-off flight path areas, and the PANS-OPS surfaces for instrument flight procedures**.**

9 Charting of aerodromes

All aerodromes promulgated in the AIPNZ will be shown on the applicable aeronautical charts. Other aerodromes not published in the AIPNZ will be shown on applicable aeronautical charts when the Director determines that there is a need for these aerodromes to be shown for the safety of air navigation.

APPENDIX 1 – AERODROME DATA AND INFORMATION

Units of measurement

dimensions	metres
heights and elevations	feet
distances	nautical miles
weights	kilograms
bearings	specified as true or magnetic
magnetic variation	value for 1 January for year of the survey, based on the aerodrome reference point
coordinates	degrees, minutes, and seconds measured to the nearest second
geodetic datum	all co-ordinates referenced to the WGS84 datum (Chatham Islands use Chatham datum 1979)

1 Domestic aerodromes

(L - applies to land aerodromes)
(W - applies to water aerodromes)

The following data and information applicable to the aerodrome must be provided to the AIS for publication in the AIP:

1.1 General (L&W)

Provide contact details as follows:

(a) name of the aerodrome;

(b) identity of the aerodrome operator;

(c) postal address of the aerodrome operator;

(d) telephone number;

(e) facsimile number (if available);

(f) AFTN address (if available); and

(g) non-certificated aerodromes — the name and contact details of the person nominated by the aerodrome operator to be responsible for the notification of the aerodrome data and information.

1.2 Aerodrome status (L&W)

Licensed aerodrome; or

Certificate aerodrome; or

Non-certificated.

1.3 Aerodrome availability (L&W)

Licensed aerodrome — Public or private and user limitation.

Other aerodromes — declaration as public use, private use, or military.

1.4 Operational conditions or limitations (L&W)

Weight restrictions, restricted use of movement areas, non standard circuit procedures or flight paths, special weather phenomena, or any other safety matter such as parachute or glider activities.

1.5 Aerodrome location (L&W)

Allocated aerodrome location indicator (Application is to be made on form CAA 24IDA for allocation of location indicator).

True bearing and distance in nautical miles from the nearest significant reference point such as town, city or named topographical feature within 10 nm.

1.6 Aerodrome Plan (L)

The following information is to be shown on a plan of the aerodrome certified by a registered surveyor:

(a) latitude and longitude of the aerodrome reference point in degrees, minutes and seconds;

(b) runways —

(i) designation, dimensions and longitudinal slopes of each runway and associated stopways, clearways, and starter extensions;

(ii) elevation above mean sea level (AMSL) of each runway threshold; and

(iii) coordinates of each runway threshold;

(c) dimensions of each runway strip and runway end safety area;

(d) depiction of each taxiway and apron area;

(e) coordinates of aircraft stands (if needed for INS);

(f) VOR check point radial and distance from the facility;

(g) markings and lighting;

(h) location of windsocks and whether lit;

(i) location of the nearest telephone available for use by pilots; and

(j) location, height (AMSL and AGL) and description of any aerodrome significant obstacle i.e. any obstacle that intrudes into any of the aerodrome obstacle limitation surfaces.

1.7 Aerodrome data (L)

Provide the following data for each runway and their associated facilities:

(a) surface of each runway expressed as concrete, bitumen, grass (firm or soft), metal (stabilised with lime, cement, or bitumen), or rolled earth;

(b) strength of each runway expressed as the pavement classification number (PCN) for a paved surface and equivalent single wheel load (ESWL) for other surfaces;

(c) the centre line magnetic bearing of each runway expressed in three digits to the nearest whole degree;

(d) the effective operational lengths for each runway (refer to Appendix 2 for guidance);

(e) the group number rating of each runway (refer to Appendix 2 for guidance);

(f) description of the —

- runway lighting for each runway;
- approach lighting for each runway;
- visual approach slope indicator system including the glide path angle and threshold crossing height for each runway;
- circling guidance lights, lead in light system, runway end identification lights, runway alignment indicator lights;
- other movement area lighting, taxiway, apron floodlighting, reflectors;
- aerodrome beacon, hazard lights;
- lighting controls and limitations of use;
- emergency lighting; and
- secondary power supply and for which facilities.

1.8 Aerodrome services (L)

Details of the aerodrome services provided at the aerodrome (item (d) is optional) —

(a) hangar space, fuel types and availability, and repair facilities normally available for visiting aircraft;

(b) rescue fire service - category and hours of attendance;

(c) aerodrome air traffic service - type and hours of operation; and

(d) fees.

1.9 Aerodrome plan (W)

The following information is to be shown on a plan of the aerodrome in relation to the surrounding area. Dimensions are to be given in metres —

(a) latitude and longitude of the aerodrome reference point in degrees, minutes and seconds;

(b) the area designated as an aerodrome;

(c) dimensions of the aerodrome boundaries or water channels, or both; and

(d) mooring and beaching facilities.

2 Heliport data

2.1 General

Provide contact details as follows —

(a) name of the heliport;

(b) identity of the heliport operator;

(c) postal address of the heliport operator;

(d) telephone number;

(e) facsimile number (if available);

(f) AFTN address (if available); and

(g) the name and contact details of the person nominated by the heliport operator responsible for the notification of the heliport data and information.

2.2 Heliport availability

Statement whether the heliport is available for public or private use.

2.3 Operational conditions and limitations

Maximum overall length of the largest helicopter that can use the heliport in terms of heliport design.

2.4 Heliport location

Allocated heliport location indicator (application is to be made on form CAA 24IDA for allocation of location indicator).

Latitude and longitude of the heliport touchdown and lift-off area (TALO) in degrees, minutes, and tenths.

True bearing and distance in nautical miles from the nearest significant reference point i.e. nearest town, city, or named geographical point within 10 nm.

2.5 Heliport plan

The following information is to be shown on a plan of the heliport in relationship to the surrounding area:

(a) elevation of the heliport above mean sea level;

(b) dimensions of —

(i) final approach and take-off areas (FATO);

(ii) touchdown and lift-off areas (TALO);

(iii) safety areas;

(iv) helicopter ground taxiways;

(v) air taxiways; and

(vi) aprons;

(c) location of a FATO and TALO in relation to a runway or taxiway;

(d) approach and take-off climb surfaces dimensions and centre line magnetic bearings in 3 digits to the nearest degree;

(e) markings and lighting;

(f) location, height (AMSL and AGL) of significant obstacles, that is, any obstacles that intrude into any heliport obstacle limitation surface; and

(g) location of windsocks.

2.6 Heliport data

Provide surface detail as follows —

(a) FATO and TALO surface composition (grass, bitumen, concrete); and

(b) TALO surface bearing strength expressed in kilograms.

APPENDIX 2 – RUNWAY EFFECTIVE OPERATIONAL LENGTHS

1 How to determine runway EOL

1.1 This appendix provides guidance on the methods that can be used to determine the obstacle limitation surfaces specified for aerodromes and the calculation of runway EOL.

1.2 An option which may be employed to determine obstacle limitation surfaces of a runway serving aeroplanes at or below 5700 kg MCTOW is a survey conducted by a qualified surveyor and this practice is not discouraged particularly if the degree of accuracy required is critical. However, runways at this level of aviation are fairly basic and obstacle limitation surfaces can be effectively determined by using the guidance contained in this AC using simple inexpensive equipment.

1.3 The main obstacle limitation surfaces of a runway are the approach and take-off climb surfaces which extend off the ends of a runway. This AC concentrates on these surfaces but the techniques and formulas can be adjusted and used to determine other specified obstacle limitation surfaces.

1.4 Accurate information has to be declared about the various physical distances available for the landing and take-off of aeroplanes. A way of doing it is laid out in the following steps starting from basic principles.

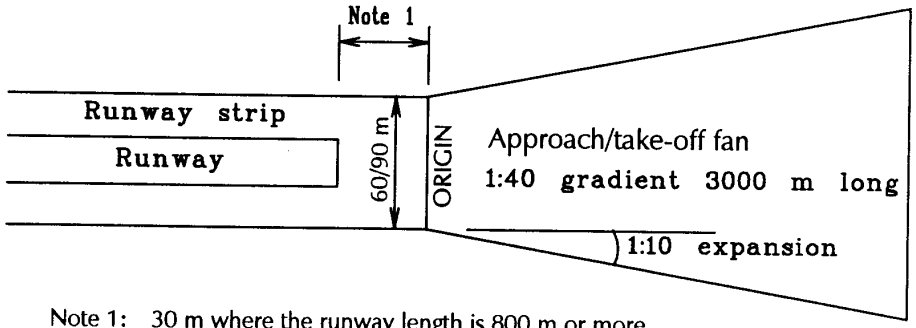
STEP 1. Establish the location of the origin of the obstacle-free approach or take-off fan. The origin is coincidental with the end of the runway strip as shown in figures 1 and 2 below.

The origin level is taken as being the same as the highest point along the origin line.

Figures 1 and 2 also illustrate the dimensions of the approach/take-off fans as specified in AC139-7 aerodrome design.

None of the following drawings are to scale

Runway used for IFR or at night



Note 1: 30 m where the runway length is 800 m or more
10 m where the runway length is less than 800 m

Figure 1

Runway used in daylight VFR

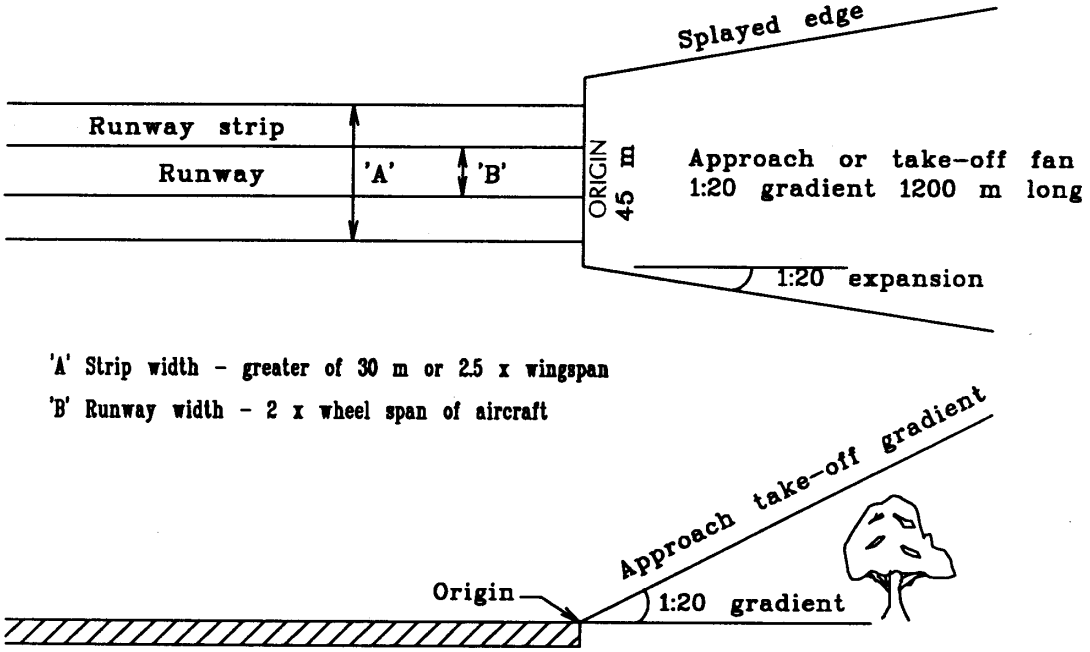


Figure 2

STEP 2. Establish the location of the approach or take-off fan edges. The following illustrates a method of determining where the splayed sides of a fan lie; and therefore what trees or obstacles may be within the fan area.

(a) Place 1st flag at the corner of the origin.

(b) Walking away from the runway, place 2nd flag 10 m for IFR or night runway, 20 m for a day VFR runway beyond the first one. Ensure it is in a line parallel with the strip edge.

(c) Place 3rd flag 1000 mm outside 2nd flag, that is at right angles to the strip edge.

Walk back to the 1st flag and look along the line over the 1st and 3rd flags to see the splay edge.

(d) Repeat the technique from the other end of the origin to obtain the other fan edge.

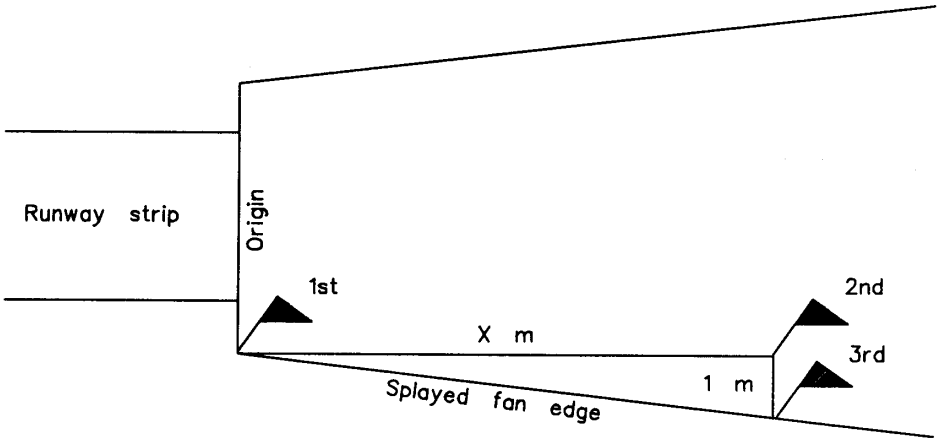


Figure 3

STEP 3. Look at the approach or take-off gradient and see if it is free of infringing obstacles, or if a displaced threshold is required.

This method assumes the use of an Abney level, or similar instrument, sighted for convenience, at 1000 mm above ground level.

Alternatively two poles, 1000 mm and 2000 mm long respectively, with a short cross bar on the top of each can be used for a simple check. A person has to hold each pole, spaced exactly 20 m apart. You then sight across the top of the lower pole to the top of the other. The bottoms of the poles must be on the same level as the origin.

(a) Because the Abney level is used 1000 mm above the ground (that is 1000 mm above the origin level), and the required gradient is 1:20, go 20 m beyond the runway end and check across the full width of the fan that the 1:20 gradient is clear above all obstacles.

In this case a displaced threshold is not necessary. The gradient is clear. The Effective Operational Length for landing or take-off will be the full length of the runway.

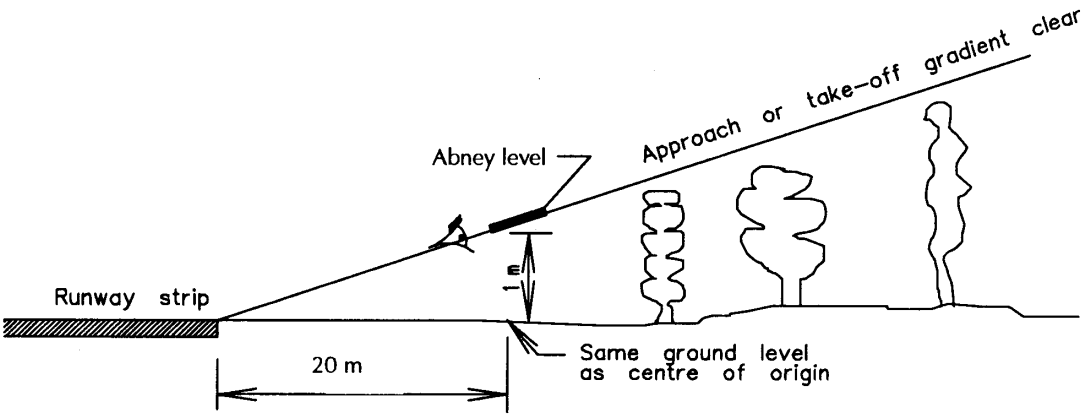


Figure 4

(b) If an obstacle penetrates the gradient —

Go to where the 1:20 gradient just clears the worst infringing obstacle in the fan.

Because the Abney was 1000 mm off the ground, the point at which the 1:20 gradient meets the ground is 20 m behind you.

This is the point at which to mark the displaced threshold.

Measure the distance from the displaced threshold to the end of the runway. The total landing distance will be the runway length reduced by this displacement.

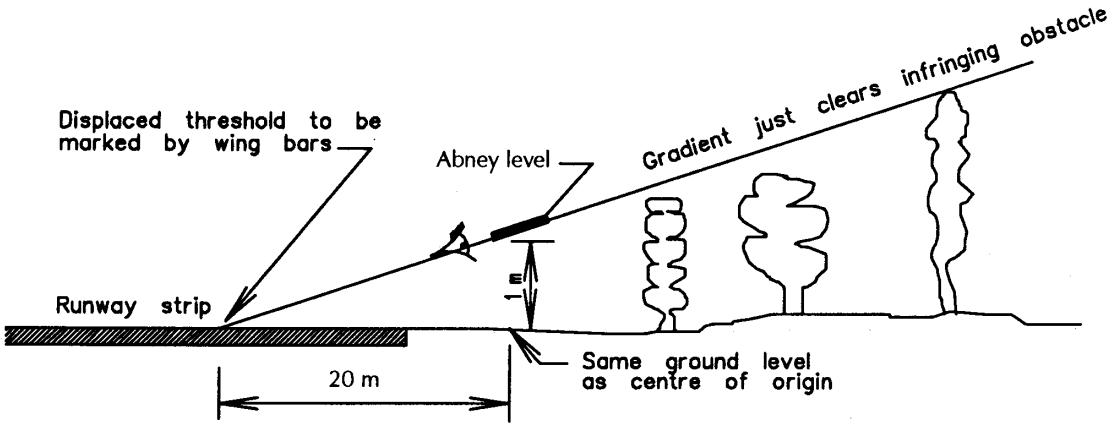


Figure 5

STEP 4. The aerodrome data required by aeroplane operators, and that promulgated in the Aeronautical Information Publication (AIP), is:

(a) the actual dimensions of each runway and its associated strip, together with clearway and stopway; and

(b) the declared distances or effective operational lengths of each runway, based on the required take-off and approach obstruction surfaces including any starter extension that may exist.

The following examples are based on a land aerodrome used only for VFR by day and having a runway length of 960 m. The runway designation is RWY 16/34, and obstacle free gradients for take-off and landing are 1:20.

Example 1. Calculation of landing distance

The mathematical calculations are:

Runway 16	Actual length RWY 16	960 m
	landing threshold displacement	60 m
	1:20 landing distance is	960 - 60 = 900 m

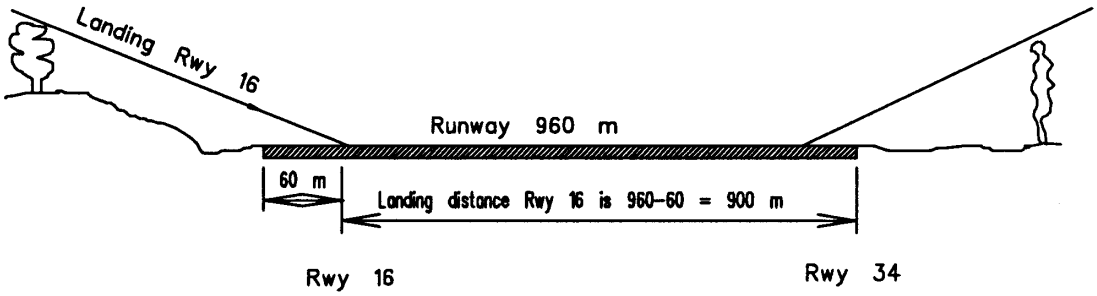


Figure 6

Runway 34	Actual length RWY 34	960 m
	landing threshold displacement	16 m
	1:20 landing distance is	960 - 16 = 944 m

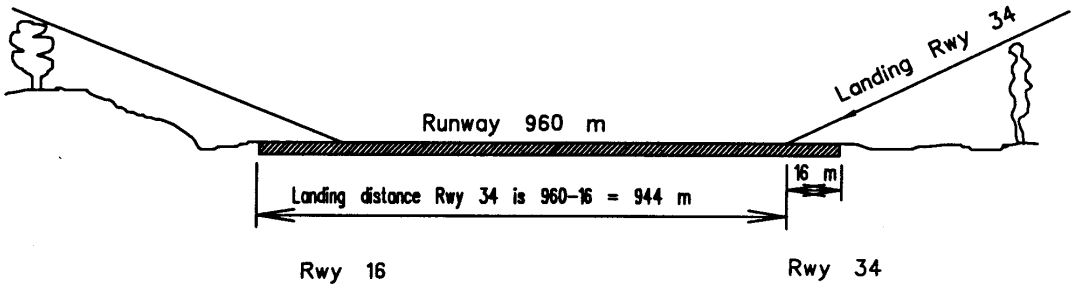


Figure 7

The existence of a starter extension (which can only be used for the take-off run) is irrelevant to the landing distance.

Example 2. Calculation of take-off distances:

Runway 16	Actual length RWY 16	960 m
	take-off gradient displacement	16 m
	1:20 take-off distance is	960 - 16 = 944 m

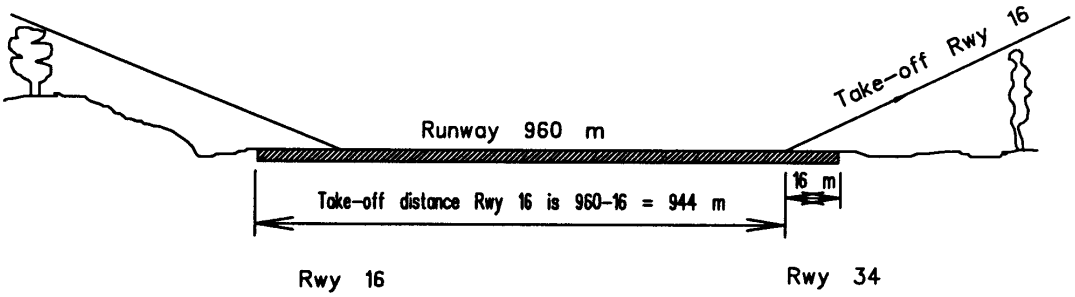


Figure 8

Runway 34

Actual length RWY 34	960 m
take-off gradient displacement	60 m
1:20 take-off distance is	960 - 60 = 900 m

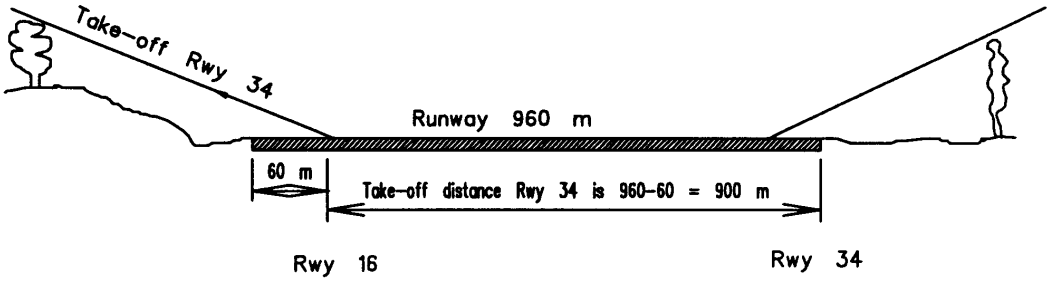


Figure 9

If runway 34 had a starter extension of 100 m, the effective take-off distance would be increased by this amount, that is, to 1000 m.

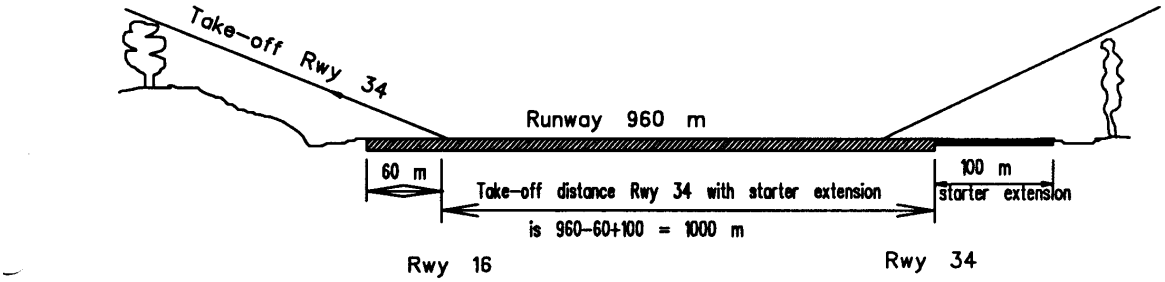


Figure 10

1.5 All the previous examples are based on aerodromes used only by day VFR.

1.5.1 The same aerodromes could be equipped with night lighting or have an instrument approach. In this case the required approach and take-off gradients are 1:40 and the fan splay is greater at 1:10.

1.5.2 Calculating landing and take-off distances is done in the same manner as for the 1:20 day examples. Use of the Abney level is also similar except that the point from which it is used will be 40 m away from where the gradient meets the ground — assuming it is sighted from 1000 mm above the origin level.

1.5.3 Figure 11 illustrates both the 1:20 gradients and the 1:40 gradients and resultant effective operational lengths.

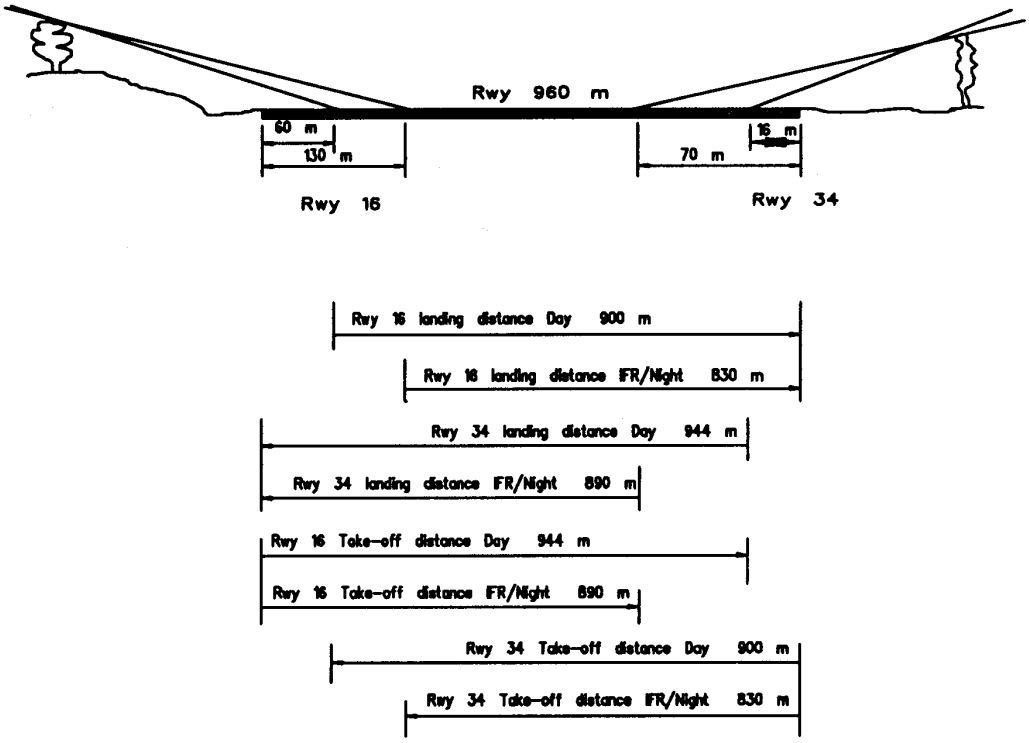


Figure 11

These runway effective operational lengths would be like this:

RWY	Take-off distance		Landing distance	
	IFR or Night	Day	IFR or Night	Day
	1:40	1:20	1:40	1:20
16 **34**	890 830	944 900	830 890	900 944

2 Determining the group rating of a runway

2.1 This Appendix has shown how to determine where the obstacle free surfaces are located at the ends of a runway, and how to calculate runway EOL. The last bit of data that has to be published is the runway's group rating.

2.2 The performance group rating system has been in use for a number of years as a simple method for operators of aeroplanes with a MCTOW of 2270 kg or less to determine the adequacy of the runway length for their particular aeroplane type.

2.3 Each aircraft type with a MCTOW of 2270 kg or below is given a group rating number in the aircraft flight manual. The number for a particular aircraft type is determined on the basis of its take-off and landing performance.

2.4 Each runway is given a group number and, in practice, a pilot may use any runway that has a group number equal to or greater than the aeroplane group rating for the aeroplane type.

2.5 To find the group rating, there are two steps to be taken:

(a) Consult Table 1, below, to find the highest group rating number for the runway EOL; and

(b) Use the graph to apply a correction factor for any runway slope.

STEP 1. A level runway

For each group rating the table gives the minimum length of level grass runway that is required corrected for altitude.

For aerodrome elevations between the 500 foot intervals, the runway length has to be extrapolated.

Example 1. What is the group rating for a non-sloping 672 m runway, 500 ft AMSL?

Answer: At 500 ft AMSL Group 5 requires 680 m.

Since the runway is just under this length it will be only Group 4.

Example 2. What is the group rating for a non-sloping 895 m runway, at 350 ft elevation?

Answer: Group 7 requires 902 m at 500 ft

and 823 m at sea level

the difference = 79 m divided by 10 (for 50 ft intervals)

= approximately 8 m more is needed for every 50 ft increase in elevation

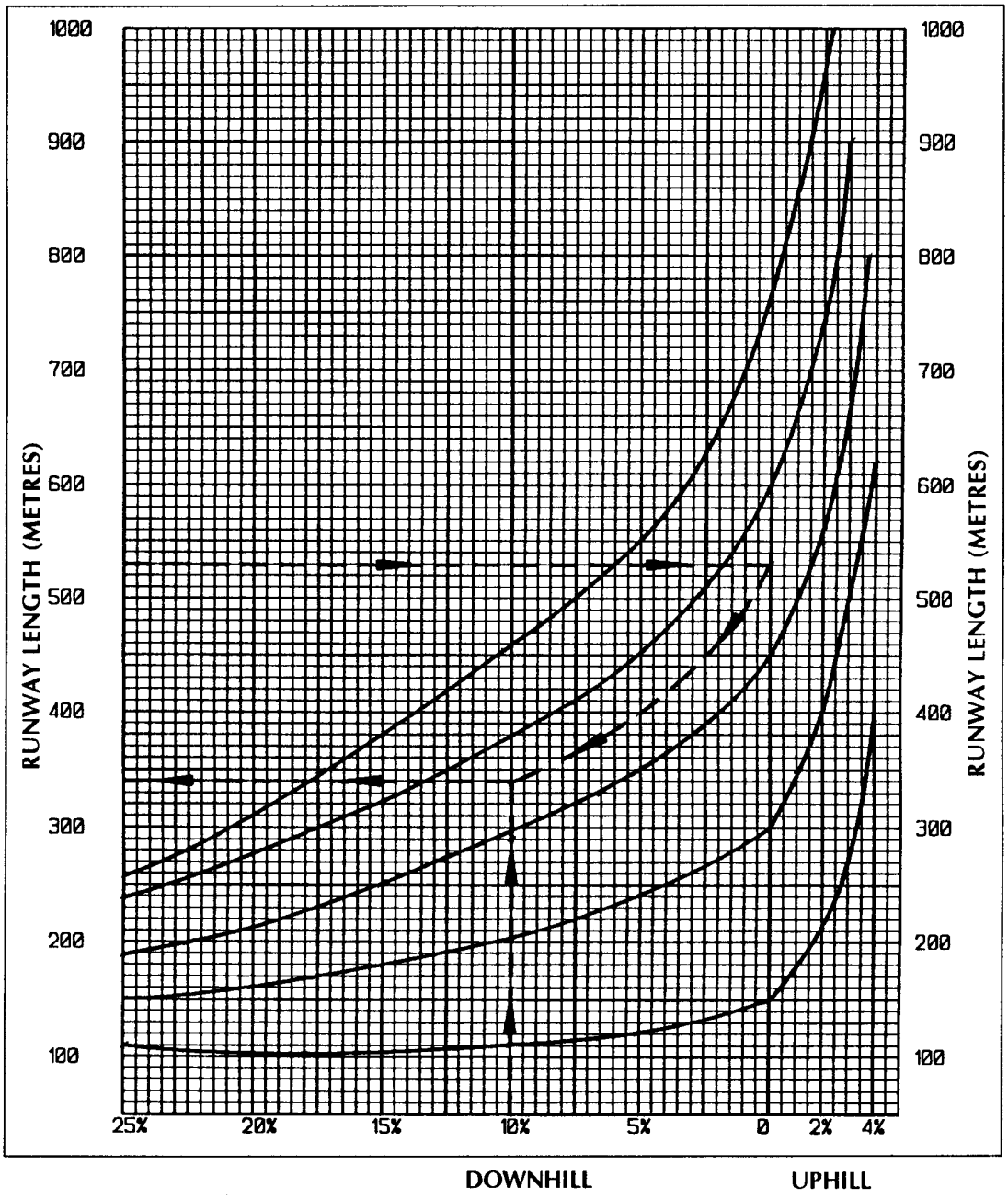
Group 7 requires 823 (sea level) + [7 x 8 m] (at 350 ft) = 823 + 56 = 879 m.

Since the runway is 895 m long, group 7 aircraft could use it.

Table 1. Group Rating numbers

Minimum Length Required, of Level Grass Runway, for each Group Rating							
	Elevation above mean sea level						
Group Rating	**SL**	**500 ft**	**1000 ft**	**1500 ft**	**2000 ft**	**2500 ft**	**3000 ft**
1	300 m	323 m	341 m	363 m	384 m	404 m	424 m
2	381 m	402 m	430 m	454 m	482 m	510 m	533 m
3	457 m	485 m	512 m	546 m	579 m	610 m	634 m
4	549 m	582 m	616 m	655 m	695 m	728 m	762 m
5	640 m	680 m	719 m	765 m	811 m	850 m	890 m
6	732 m	774 m	823 m	872 m	924 m	968 m	1058 m
7	823 m	902 m	927 m	981 m	1039 m	1085 m	1146 m
8	914 m	969 m	1027 m	1088 m	1152 m	1204 m	1265 m

GROUP RATING - RUNWAY SLOPE GRAPH
Guidance data for aircraft below 2270 kg MCTOW



Note: Slope is the ratio of $\frac{\text{elevation change}}{\text{runway length}}$ expressed in common units as a percentage

Slope in percentage expressed as an angle

1% ..... 0°35'	9% ..... 5°09'	17% ..... 9°39'
2% ..... 1°09'	10% ..... 5°43'	18% ..... 10°12'
3% ..... 1°43'	11% ..... 6°17'	19% ..... 10°46'
4% ..... 2°18'	12% ..... 6°51'	20% ..... 11°19'
5% ..... 2°52'	13% ..... 7°25'	21% ..... 11°52'
6% ..... 3°26'	14% ..... 7°58'	22% ..... 12°25'
7% ..... 4°00'	15% ..... 8°32'	23% ..... 12°58'
8% ..... 4°35'	16% ..... 9°06'	24% ..... 13°30'
	25% ..... 14°02'	

STEP 2. A sloping runway

If the runway has a slope the Group Rating number may have to be modified.

An aircraft landing uphill will need less runway than it would if level. Or an aircraft landing downhill will need a greater distance for stopping. The reverse will apply for take-off.

(Wind is another factor that has to be applied, but this can only be done on the day, by the pilot.)

Using the "Group Rating - Runway Slope Graph", determine the increased or decreased length required then repeat Step 1 to find the Group Rating, allowing for the uphill or downhill slope for landing and for take-off.

Example 3 Taupo Elevation 1335 ft AMSL; Runway 11 731 m long; sloping 1.15 percent up. What is the group rating for each runway 11/29 for take-off and landing?

Calculation: At 1000 ft Group 5 requires 719 m

1500 ft Group 5 requires 765 m = 46 ft difference over 500 ft

At 1335 ft Group 5 would require 31 m more than at 1000 ft elevation = 750 m

Since runway 11/29 is a little less than 750 m long it must be Group 4.

Now to look at the slope graph:

Runway 11 is 731 m long and slopes up 1.15 percent.

The take-off distance uphill will be as though using a shorter but level runway; the landing distance will be as though on a longer level runway.

From the graph the slope corrected distances equate to 665 m and 822 m.

Take-off RWY 11 is as though on a 665 m level runway = Group 4 (which by extrapolation requires a minimum of 642 m).

Landing RWY 11 is as though on a 822 m level runway = Group 5 (which by extrapolation requires a minimum of only 750 m).

The figures for RWY 29 will be just the opposite - Group 5 for take-off down hill and Group 4 for landing downhill.

Tabulated it will look like this:

TAUPO

RWY	GROUP	SLOPE DAY 1:20	TAKE-OFF DISTANCE DAY 1:20	LANDING DISTANCE
11	4	1.15U	731	
	5	1.15U		731
29	5	1.15D	731	
	4	1.15D		731

APPENDIX 3 – AERODROME TAKE-OFF SURFACE AREA OBSTACLE SURVEYS

1 General

Take-off flight path obstacle information. The promulgated runway take-off flight path obstacle information is used for planning the take-off weights of Group A aeroplanes so as to ensure that they can clear all obstacles in the event of an engine failure during take-off. Promulgation of the information as an aerodrome obstacle chart or by descriptive text is the responsibility of AIS on receipt of the survey data from the aerodrome operator.

2 Obstruction surveys

2.1 Survey specifications. The survey specifications are based on ICAO Annex 4, Chapter 3 - Aerodrome Obstruction Charts Type A and are intended to provide detailed data from which obstacle charts or descriptive text can be derived.

2.2 Units of measurement. Elevations are to be to the nearest foot and linear dimensions are to be to the nearest half-metre. Co-ordinates are to be expressed in degrees, minutes, and seconds referenced to the WGS84 datum. (Chatham Islands use Chatham datum 1979.)

2.3 Significant obstacles. Obstacles in the take-off flight path area which project above a plane surface having a 1.2 percent slope and having a common origin with the take-off flight path area, are regarded as significant obstacles. A nominal vehicle height of 4500 mm is to be assumed to be at the nearest point from the origin of any road or railway line within the take-off flight path area.

2.4 Take-off flight path area. The flight path take-off area consists of a quadrilateral area on the surface of the earth lying directly below, and symmetrically about, the take-off flight path. This area has the following characteristics:

(a) it commences at the end of the area declared suitable for take-off (that is, at the end of the runway or clearway as appropriate);

(b) its width at the point of origin is 180 m and this width increases at the rate of 0.25D to a maximum of 1800 m, where D is the distance from the point of origin; and

(c) it extends to the point beyond which no significant obstacles exist or to a distance of 10 kilometres, whichever is the lesser.

2.5 Obstacle data and information. The following information and data is required to be provided for each runway and its associated take-off flight path area:

(a) **Point of origin**. The point of origin location and elevation above mean sea level (AMSL) for each runway regularly used by Group A aircraft. The elevation of the point of origin is taken as the highest point of ground level along the centreline between the runway end and the end of the runway strip or clearway.

(b) **Runway**:

(i) runway designation;

(ii) the following declared distances —

- take-off run available (TORA);
- accelerate-stop distance (ASDA);
- take-off distance available (TODA); and

- landing distance available (LDA); and

(iii) refer to AC139-6 Aerodrome design, aeroplanes above 5700 kg MCTOW, Chapter 2 for guidance about the calculation of runway declared distances.

(c) **Take-off flight path area**:

(i) the exact location of each significant obstacle expressed as a distance from the point of origin and from, right or left, of the extended centre line or the extended flight path;

(ii) in the case of a turned flight path, the radius of turn, the distance from the beginning of the runway to the centre of the curvature and the degrees turned; and

(iii) the identification and the elevation (AMSL) of the top of each obstacle.

2.6 If the initial, or recurring, survey reveals no significant obstacle, provide a statement to that effect.

2.7 If a recurring survey reveals no change in the significant obstacles, provide a statement to that effect.