ATTACHMENT 3

Building Restricted Areas for Aviation Facilities (Communication)

Satellite Ground Stations

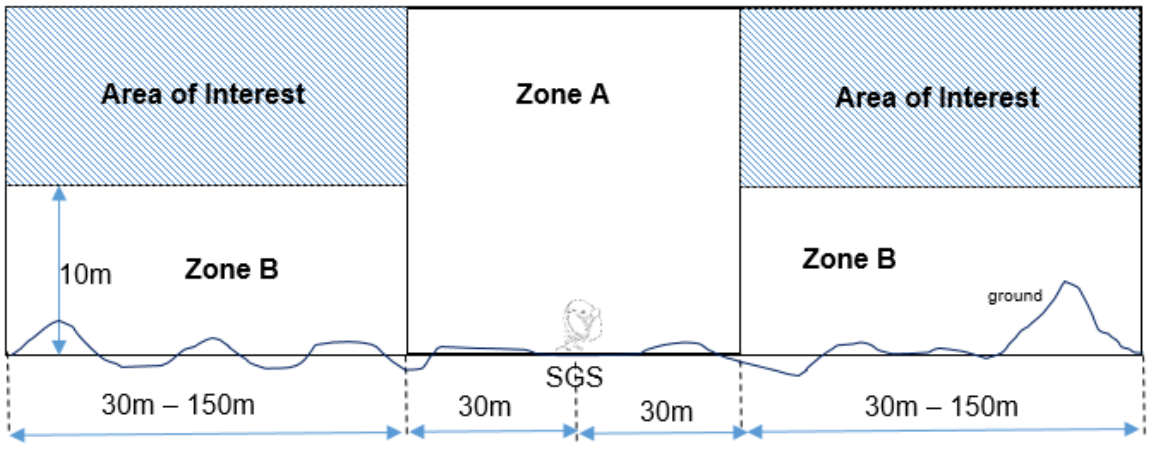
51. Satellite Ground Stations sites are used to relay communications and surveillance data back to Airservices main air traffic control sites.

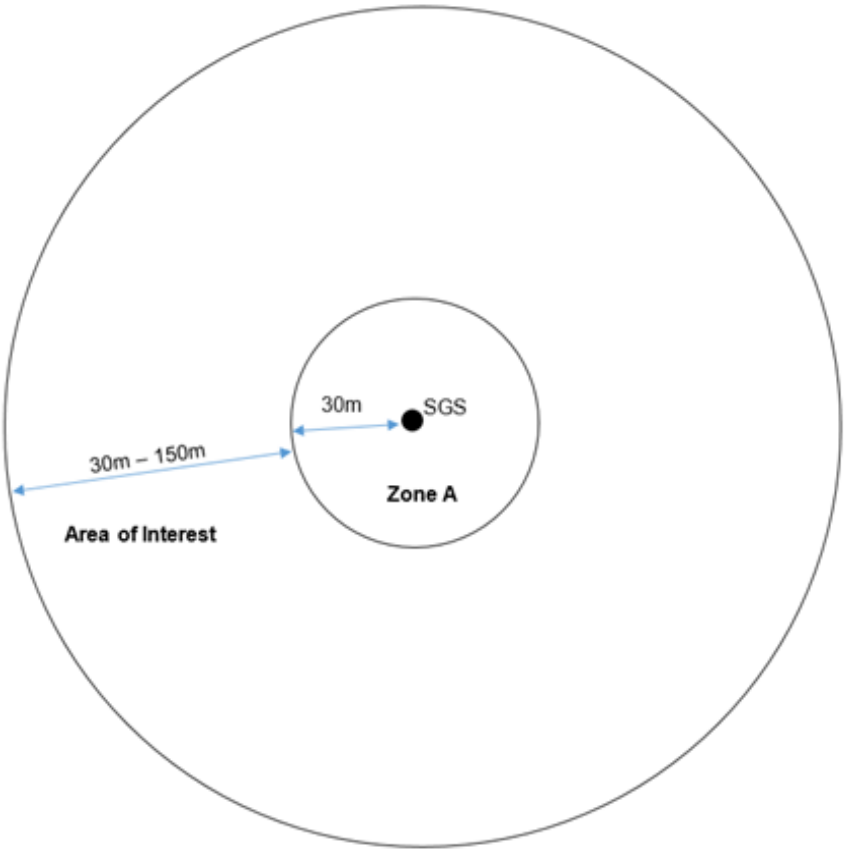
    Satellite Ground Stations antennae must have clear line of sight to any satellite located on the geostationary arc between 122E and 172E (corresponding to Asiasat4 and GE23).

    This alignment has an elevation angle greater than 20 degrees for any site in Australia.

    If it is likely that a proposed development will infringe these requirements details of the proposal should be sent to Airservices for technical assessment.

Building Restricted Area	Location of development	Action required
Zone A	If development is located within 30 metres of the Satellite Ground Station facility, regardless of height.	All applications must be referred to Airservices Australia for assessment.
Zone B	If development is located between 30 – 150 metres from the base of the Satellite Ground Station site and is less than 10 metres in height.	No requirements.
Area of interest	If development is located between 30 – 150 metres from the base of the Satellite Ground Station and is greater than 10 metres in height.	All applications must be referred to Airservices Australia for assessment.
General guidance - substantial structures are generally limited within 30m of the antenna.		

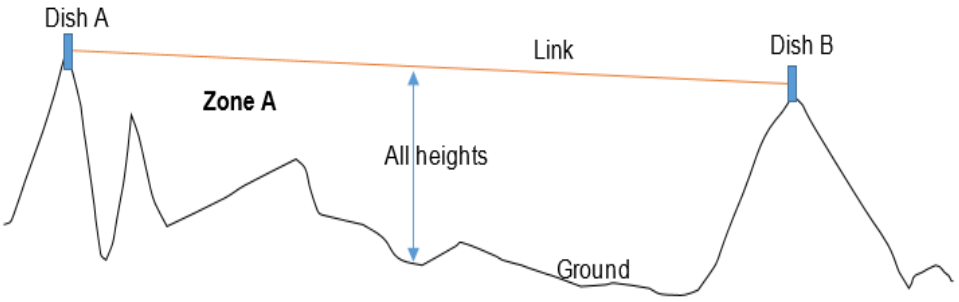


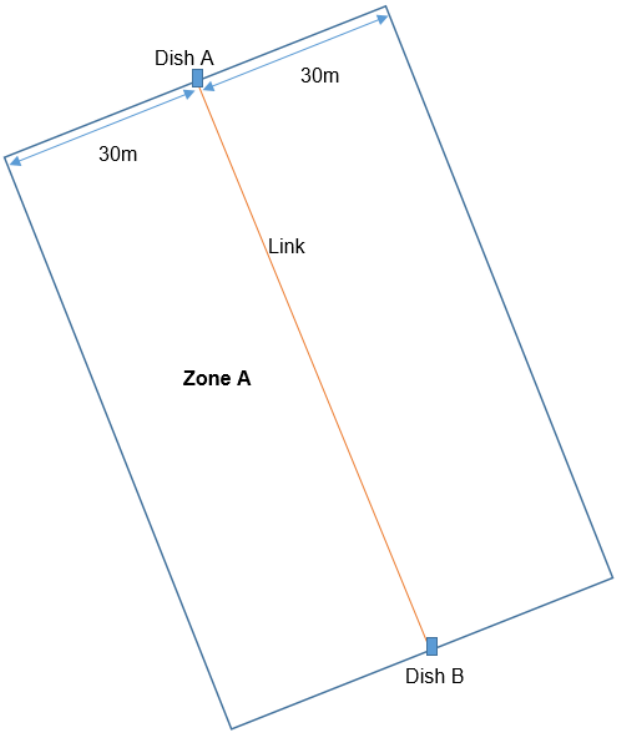

30m
SGS
30m – 150m
Zone A
Area of Interest

Radio Links

52. Radio links are used to relay communications, navigation and surveillance data back to Airservices main air traffic control sites. These links are vital to the provision of air traffic control services and require a clear line of sight from end to end to be able to accurately relay the required data.

Building Restricted Area	Location of development	Action required
Zone A	If development is located within 30 metres of the radio link.	All applications must be referred to Airservices Australia for assessment.
General guidance - no temporary or permanent obstructions should infringe on Zone A.		



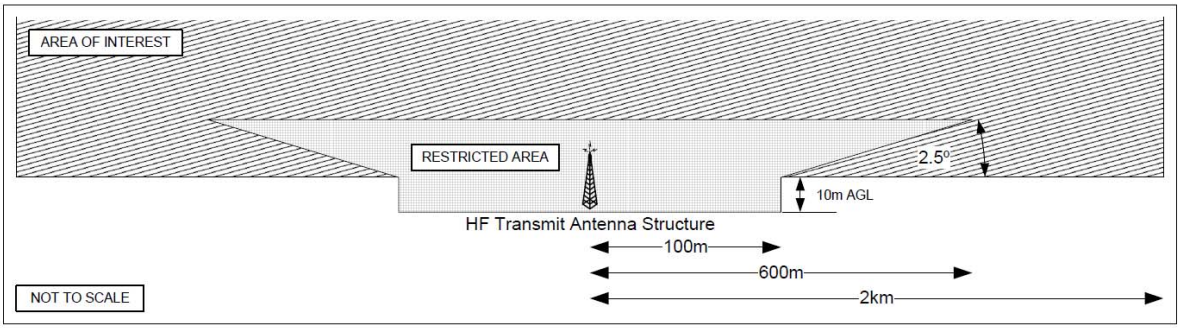


High Frequency

53. Airservices Australia currently operates and maintains two High Frequency voice communication networks (domestic and international), to provide air traffic services to the aviation community. These include High Frequency transmit and receive antennae.

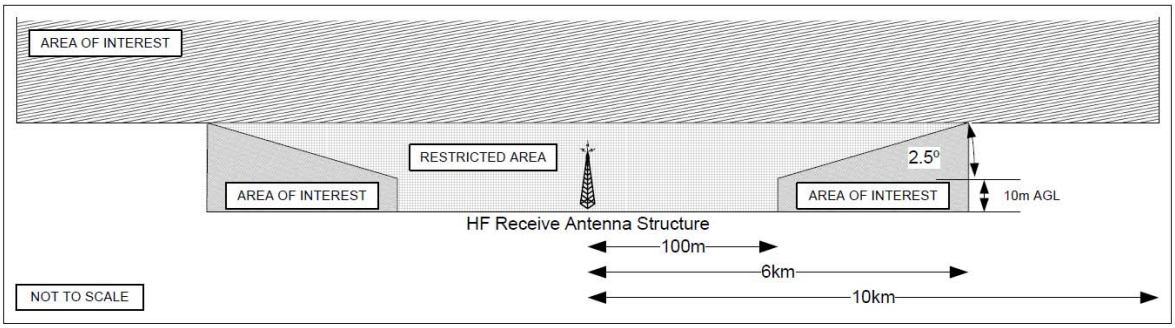
High Frequency Transmit Site

Building Restricted Area	Location of development	Action required
Zone A	If development is located: a. within 100 metres of the High Frequency transmit antenna; or b. between 100-600 metres from the centre of the High Frequency transmit antenna and the development will cross the zone boundary (defined as an elevation angle of 2.5° starting at 10 metres above ground level).	All applications must be referred to Airservices Australia for assessment.
Area of Interest	If development is located between 100-2,000 metres from the centre of the High Frequency transmit antenna and >10 metres above ground level.	All applications must be referred to Airservices Australia for assessment.
Zone B	If development is located between 100-2,000 metres from the High Frequency transmit antenna and does not cross the zone boundary.	No requirements. Airservices Australia should be advised of proposals for large obstructions.
General guidance: • substantial structures are generally limited within 100 metres of the antenna; • simple vertical towers and masts of any height are acceptable beyond 100 metres from the antenna; and • developments within the Area of Interest will be assessed on a case by case basis for adverse impacts to the High Frequency receiver site.		



High Frequency Receiver Site

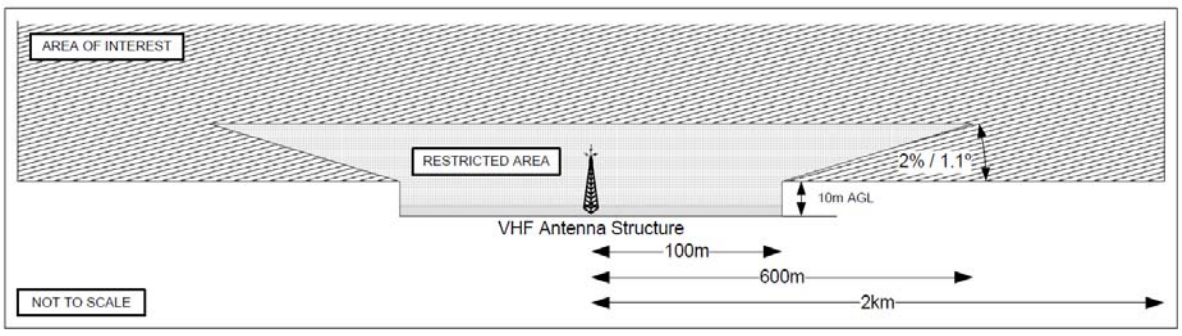
Building Restricted Area	Description	Action required
Zone A	If development is located: a. within 100 metres of the High Frequency receive antenna; or b. between 100-6000 metres from the centre of the High Frequency receive antenna and the development will cross the zone boundary, defined as an elevation angle of 2.5° starting at 10 metres above ground level.	All applications must be referred to Airservices Australia for assessment.
Area of Interest	If development is located: a. between 100-6000 metres from the centre of the High Frequency receive antenna and below the height of Zone A; or b. between 6,000-10,000 metres and is >267 metres above the height of the High Frequency antenna.	All applications must be referred to Airservices Australia for assessment.
Zone B	If development is located between 6,000-10,000 metres from the centre of the High Frequency receiver antenna and the development will not cross the zone boundary.	No requirements. Airservices Australia should be advised of proposals for large obstructions.
General guidance: • substantial structures are generally limited within 100 metres of the antenna; and • developments within the Area of Interest will be assessed on a case by case basis for adverse impacts to the High Frequency receiver site		



Very High Frequency

54. Very High Frequency is used for air to ground voice communications and allows aircraft and air traffic control to communicate effectively. Very High Frequency equipment is also used for the transmission of aeronautical terminal information service to aircraft.

Building Restricted Area	Description	Action required
Zone A	If development is located: a. within 100 metres of the Very High Frequency antenna; or b. between 100-2000 metres from the centre of the Very High Frequency antenna and the development will cross the zone boundary (defined as an elevation angle of 2° starting at 10 metres above ground level).	All applications must be referred to Airservices Australia for assessment.
Zone B	If development is located between 100-600 metres from the centre of the Very High Frequency antenna and the development will not cross the zone boundary.	No requirements. Airservices Australia should be advised of proposals for large obstructions.
Area of interest	If development is located between 600-2000 metres from the Very High Frequency antenna.	No requirements. Airservices Australia should be advised of proposals for large obstructions.
General guidance: • A Broadcast Facility is classified as any High Power (>100W) transmitter facility, any AM/FM Radio transmitter facility & any Television transmitter facility including facilities with ACMA Emission Designators of A3E/A3EG, F2D, F8E/F8EH, or C3F/C3FN; • the propagation distance for VHF signals is governed by the line of sight from the antenna at the transmitting site. Generally, the antenna is mounted so that is it clear of obstructions such as trees, buildings and hills; and • substantial structures are generally prohibited within Zone A.		



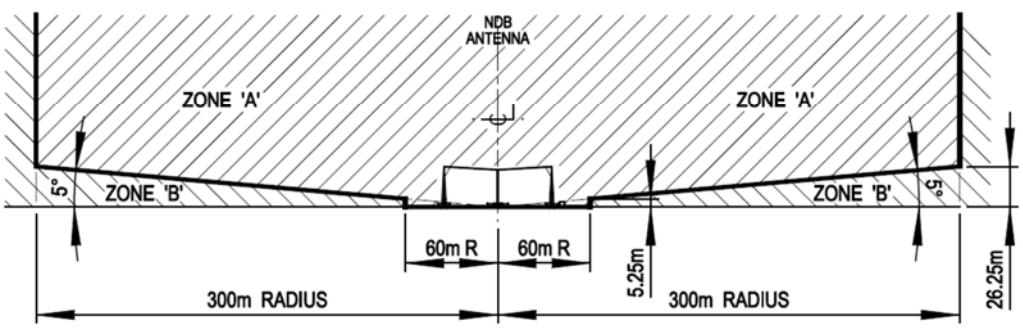
Building Restricted Areas for Aviation Facilities (Navigation)

Non-Directional Beacon

55. A Non-Directional Beacon radiates a low to medium frequency electromagnetic signal in all directions. Aircraft are equipped with an automatic direction finder which, when tuned to the Non-Directional Beacon frequency, determines the direction from where the signal emanated. This is a navigation aid used in non-precision approaches and aircraft holding patterns.

Building Restricted Area	Location of development	Action required
Zone A	If development is located: a. within 60 metres of the Non-Directional Beacon antenna; or b. between 60-300 metres from the Non-Directional Beacon antenna and the development will cross the zone boundary (defined as an elevation angle of 5° from ground level at the centre of the Non-Directional Beacon antenna).	All applications must be referred to Airservices Australia for assessment.
Zone B	If development is located between 60-300 metres from the centre of the Non-Directional Beacon antenna and the development will not cross the zone boundary.	No requirements.
General guidance: • within a 60 metres radius from the centre of the Non-Directional Beacon antenna vegetation should be kept to less than 60cm high. Naturally occurring native flora may be allowed to exceed 60cm subject to a site environment plan. • high voltage overhead powerlines 33kv or greater should be at least 300 metres from the centre of the Non-Directional Beacon antenna.		

NOT TO SCALE

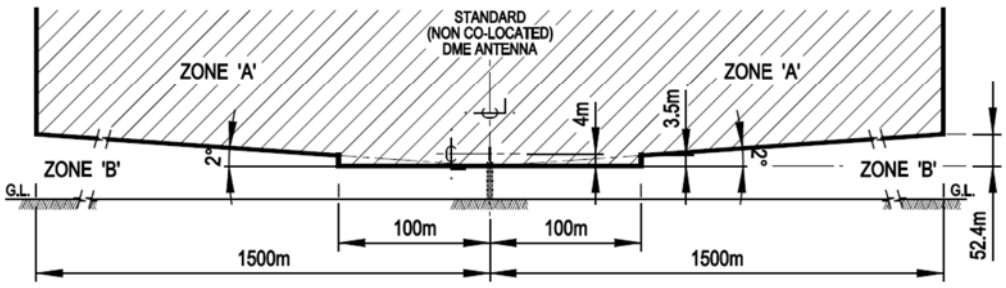


Distance Measuring Equipment

56. Distance Measuring Equipment measures the slant range between an aircraft and the Distance Measuring Equipment antenna.

Building Restricted Area	Description	Action required
Zone A	If development is located: a. within 100 metres of the Distance Measuring Equipment antenna and above a horizontal plane located 4 metres below the centre of the Distance Measuring Equipment antenna; or b. between 100–1500 metres from the Distance Measuring Equipment antenna and the development will cross the zone boundary (defined as an elevation angle of 2°, measured from the above horizontal plane beneath the Distance Measuring Equipment antenna).	All applications must be referred to Airservices Australia for assessment.
Zone B	If development is located between 100-1500 metres from the centre of the Distance Measuring Equipment antenna and the development will not cross the zone boundary.	No requirements.
General guidance: • high voltage overhead powerlines, 33kV or greater, which cross the zone boundary should be at least 300 metres from the Distance Measuring Equipment antenna; • if the Distance Measuring Equipment antenna is co-located with a Very High Frequency Omni-directional Range, Localizer or Glidepath facility, the building restricted area of the co-located facility should be used as the Distance Measuring Equipment building restricted area.		

NOT TO SCALE



Very High Frequency Omni-directional Range

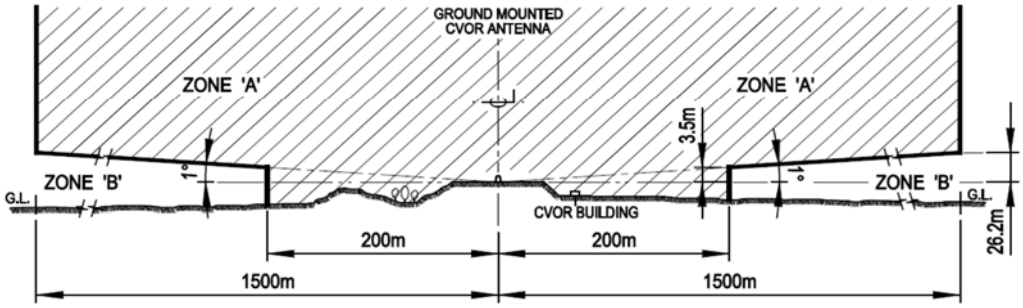
57. Very High Frequency Omni-directional Ranges are navigation aids used in non-precision approaches, aircraft holding patterns and airways routes. The Course Deviation Indicator on an aircraft calculates bearing to and from the VHF Omni-directional Range. There are two types of VHF Omni-directional Ranges, Doppler and Conventional, each of which can be mounted either on the ground or elevated.

Conventional Very High Frequency Omni-directional Range

Ground mounted Conventional Very High Frequency Omni-directional Range

Building Restricted Area	Location of development	Action required
Zone A	If development is located: a. within 200 metres of the CVOR antenna; or b. between 200-1500 metres from the centre of the CVOR antenna and the development will cross the zone boundary (defined as an elevation angle of 1° from ground level at the centre of the CVOR antenna).	All applications must be referred to Airservices Australia for assessment.
Zone B	If development is located between 200-1500 metres from the centre of the CVOR antenna and the development will not cross the zone boundary.	No requirements.
General guidance: • there should be no obstructions within a 150 metre radius from the centre of the CVOR antenna which extend above the horizontal plane. • necessary fencing above the horizontal plane within 150m of the CVOR should be wooden. • between 150m and 200m from the centre of the CVOR antenna there should generally be no obstacles which cross the zone boundary. • high voltage overhead power lines, 33kv or greater, which cross the zone boundary should be located at least 600 metres from the CVOR antenna.		

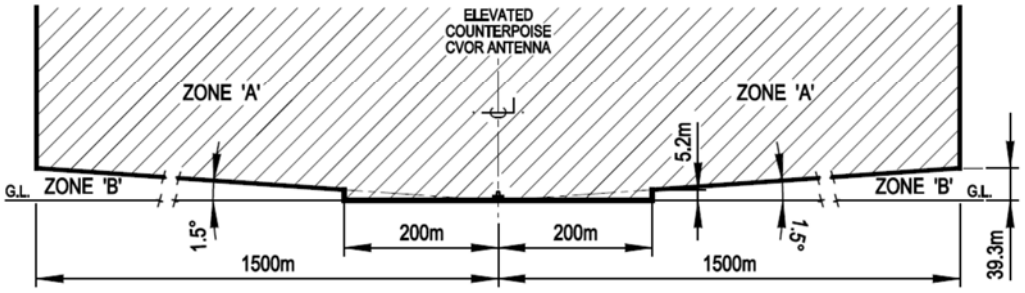
NOT TO SCALE



Elevated Counterpoise Conventional Very High Frequency Omni-directional Range

Building Restricted Area	Description	Action required
Zone A	If development is located: a. within 200 metres of the antenna; or b. between 200-1500 metres from the centre of the antenna and the development will cross the zone boundary (defined as an elevation angle of 1.5° from ground level at the centre of the antenna).	All applications must be referred to Airservices Australia for assessment.
Zone B	If development is located between 200-1500 metres from the centre of the antenna and the development will not cross the zone boundary.	No requirements.
General guidance: • single trees less than 6m tall are permitted beyond 100m from the antenna. • buildings, metallic structures and groups of trees are not generally permitted within 200m of the antenna. • high voltage overhead power lines, 33kV or greater, which cross the zone boundary should be at least 600m from the antenna.		

NOT TO SCALE

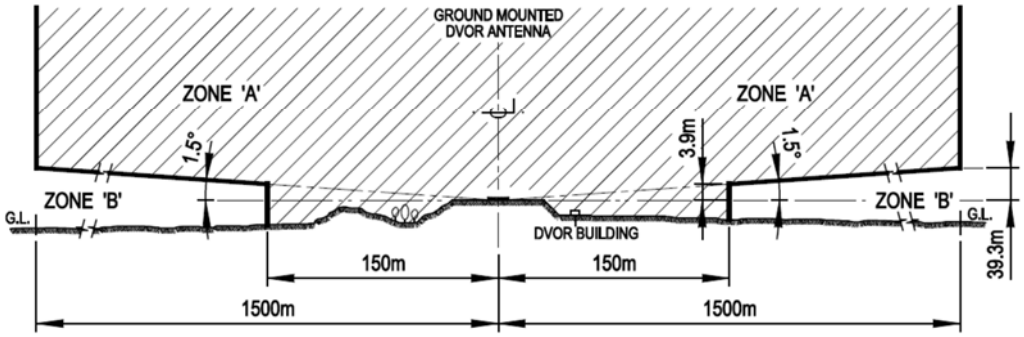


Doppler Very High Frequency Omni-directional Range

Ground mounted Doppler Very High Frequency Omni-directional Range

Building Restricted Area	Description	Action required
Zone A	If development is located: a. within 150 metres of the antenna; or b. between 150-1500 metres from the centre of the antenna and the development will cross the zone boundary (defined as an elevation angle of 1.5° from ground level at the centre of the antenna).	All applications must be referred to Airservices Australia for assessment.
Zone B	If development is located between 150-1500 metres from the centre of the antenna and the development will not cross the zone boundary.	No requirements.
General guidance: • there should be no obstructions within 100 metres from the centre of the antenna that extend beyond the horizontal plane; • necessary fencing above the horizon level within 100 metres of the antenna should be wooden; • high voltage overhead power lines, 33kV or greater, which cross the zone boundary should be at least 400 metres from the centre of the antenna.		

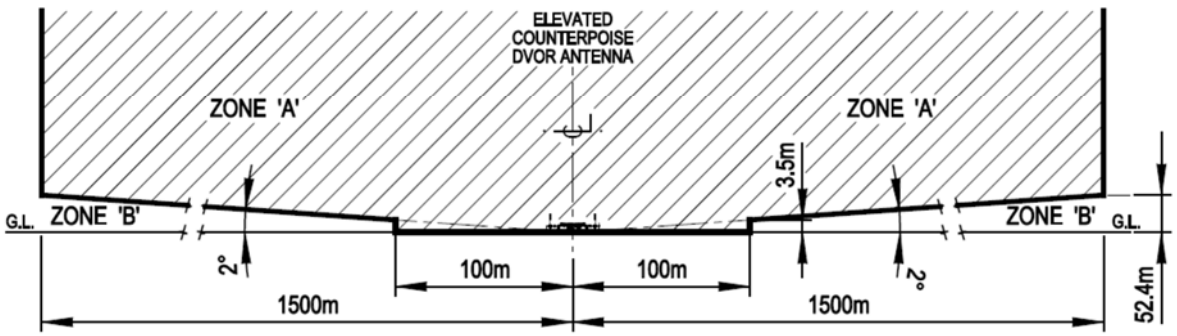
NOT TO SCALE



Elevated Counterpoise Doppler Very High Frequency Omni-directional Range

Building Restricted Area	Description	Action required
Zone A	If development is located: a. within 100 metres of the antenna; or b. between 100-1500 metres from the centre of the antenna and the development will cross the zone boundary (defined as an elevation angle of 2° from ground level at the centre of the antenna).	All applications must be referred to Airservices Australia for assessment.
Zone B	If development is located between 100-1500 metres from the centre of the antenna and the development will not cross the zone boundary.	No requirements.
General guidance: • single trees less than 6m tall are permitted beyond 75 metres from the centre of the Doppler Very High Frequency Omni-directional Range antenna; • generally buildings, metallic structures and groups of trees are not permitted within 100 metres of the Doppler Very High Frequency Omni-directional Range antenna; or • high voltage overhead power lines, 33kV or greater, which cross the zone boundary, should be at least 300 metres from the centre of the Doppler Very High Frequency Omni-Directional Range antenna.		

NOT TO SCALE



Instrument Landing System

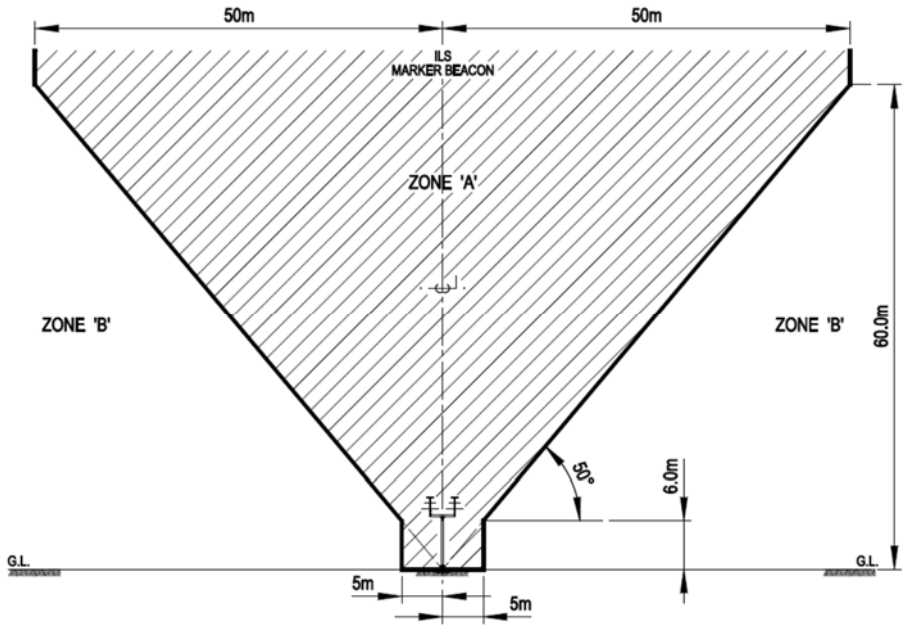
58. The Instrument Landing System is a precision navigation aid that consists of a Localizer, Glide Path, markers and monitors. Beams emanate from the antennas to provide:

    - Horizontal Guidance (Localizer), and
    - Vertical Guidance (Glide Path).

    Aircraft are guided down the horizontal and vertical beams towards the antennas to arrive at the touchdown point.

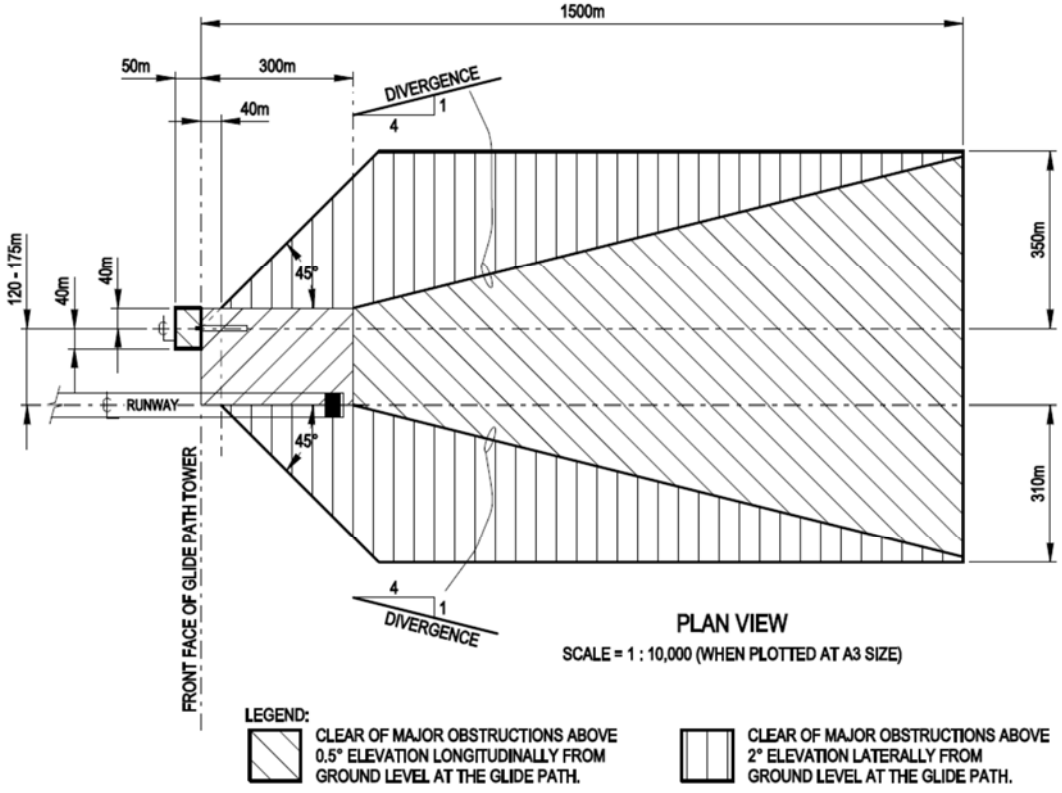
Middle and Outer Marker Beacon

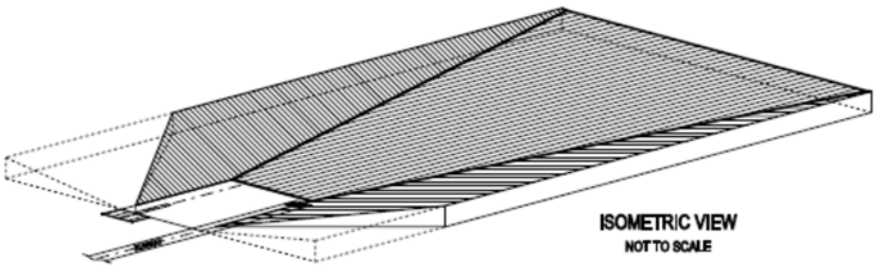
Building Restricted Area	Description	Action required
Zone A	If development is located: a. within 5 metres of the marker beacon antenna; or b. between 5-50 metres of the marker beacon antenna and the development will cross the zone boundary (defined as an elevation angle of 50° from ground level at the marker beacon antenna).	All applications must be referred to Airservices Australia for assessment.
Zone B	If development is located between 5-50 metres of the marker beacon antenna and the development will not cross the zone boundary.	No requirements.
General guidance - within 5 metres of the marker beacon, grass and other vegetation should be less than 60cm tall.		

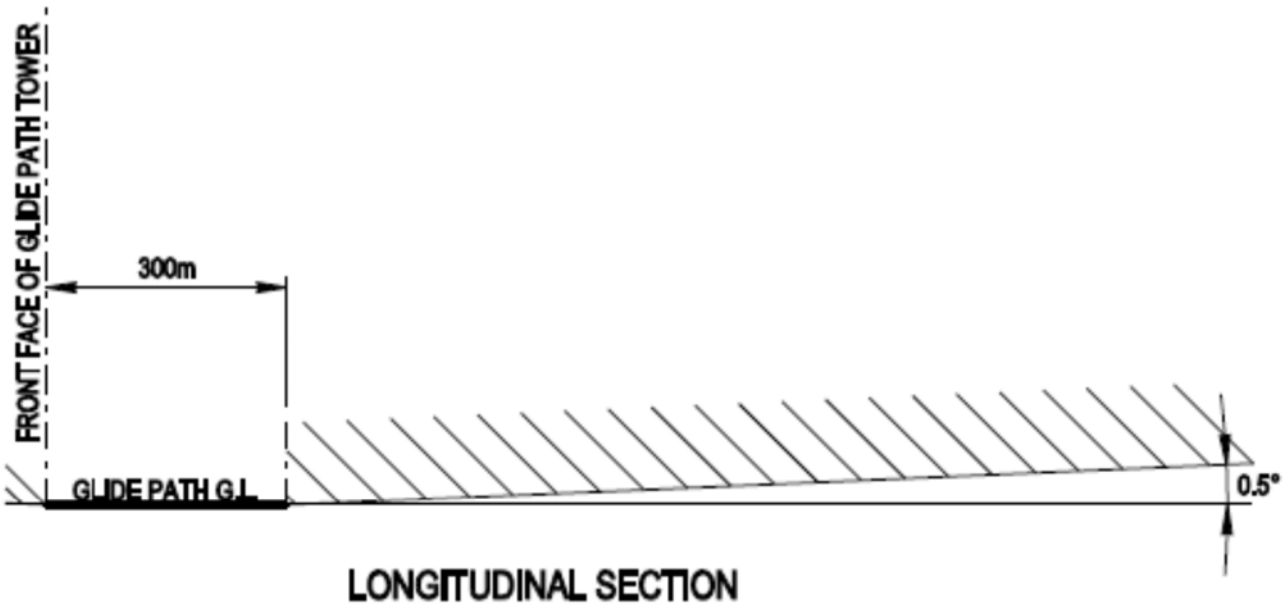


Glide Path

Building Restricted Area	Description	Action required
Zone A	If development is located: a. within the area defined as greater than 0.5° elevation longitudinally and 2° elevation laterally from the edges of the vehicle critical area (runway) (measured from the ground level at the Glide Path Antenna Tower); and b. within 40 metres either side of the extended glide path centreline to a distance of 50 metres behind the Glide Path Antenna Tower.	All applications must be referred to Airservices Australia for assessment.
Zone B	All other areas not described by Zone A.	No requirements.



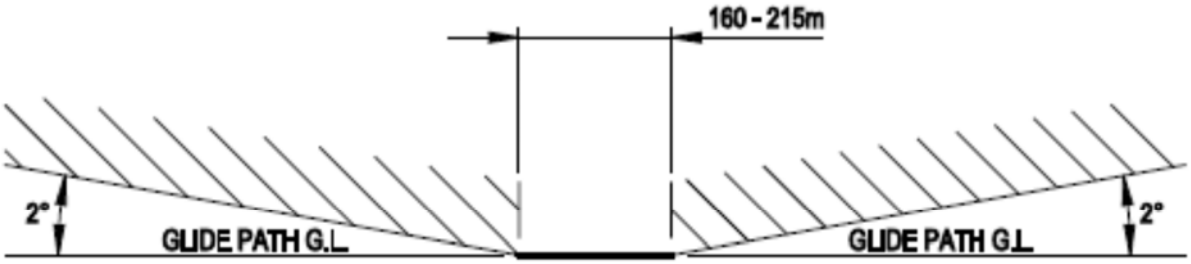




LONGITUDINAL SECTION

SCALE = 1 : 10,000 (WHEN PLOTTED AT A3 SIZE)

(NOTE: 0.5° ANGLE DRAWN 'NOT TO SCALE' FOR CLARITY)



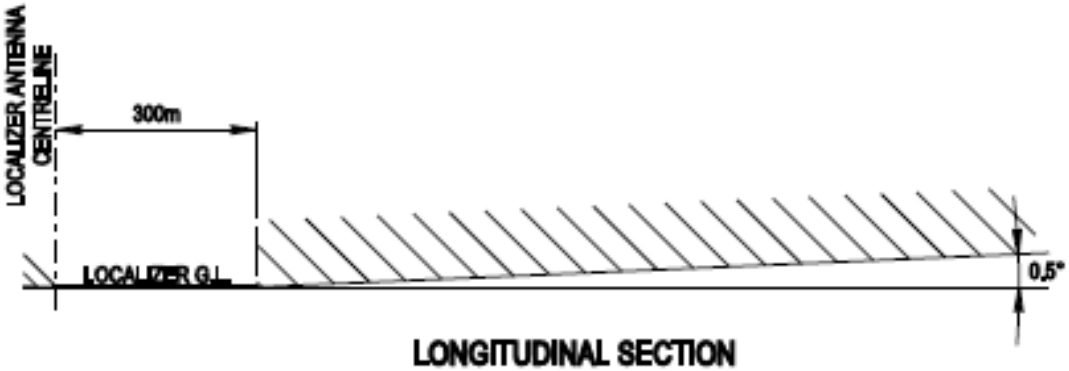
LATERAL SECTION

SCALE = 1 : 10,000 (WHEN PLOTTED AT A3 SIZE)

(NOTE: 2° ANGLE DRAWN 'NOT TO SCALE' FOR CLARITY)

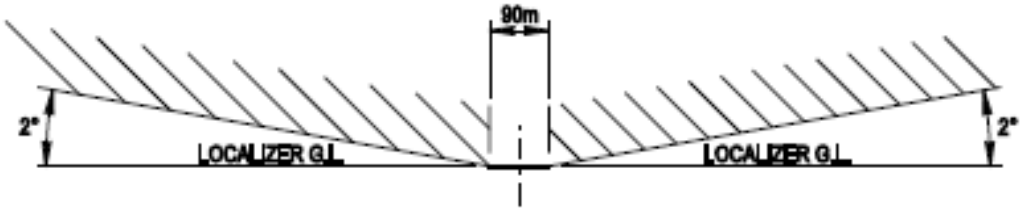
Localizer

Building Restricted Area	Description	Action required
Zone A	If development is located: a. with the area defined as greater than 0.5° elevation longitudinally and 2° elevation laterally from the edges of the vehicle critical area (runway) (measured from the ground level at the Localizer antenna); and b. within 45 metres either side of the extended runway centreline to a distance of 50 metres behind the Localizer antenna.	All applications must be referred to Airservices Australia for assessment.
Zone B	All other areas not described by Zone A.	No requirements.
General guidance - all buildings within 1,000 metres of the runway centreline, which have a vertical wall facing the runway that exceeds 2,000 square metres in area and a height more than 20 metres above the Localizer ground level (e.g. hangars/office blocks) will require assessment by Airservices Australia.		



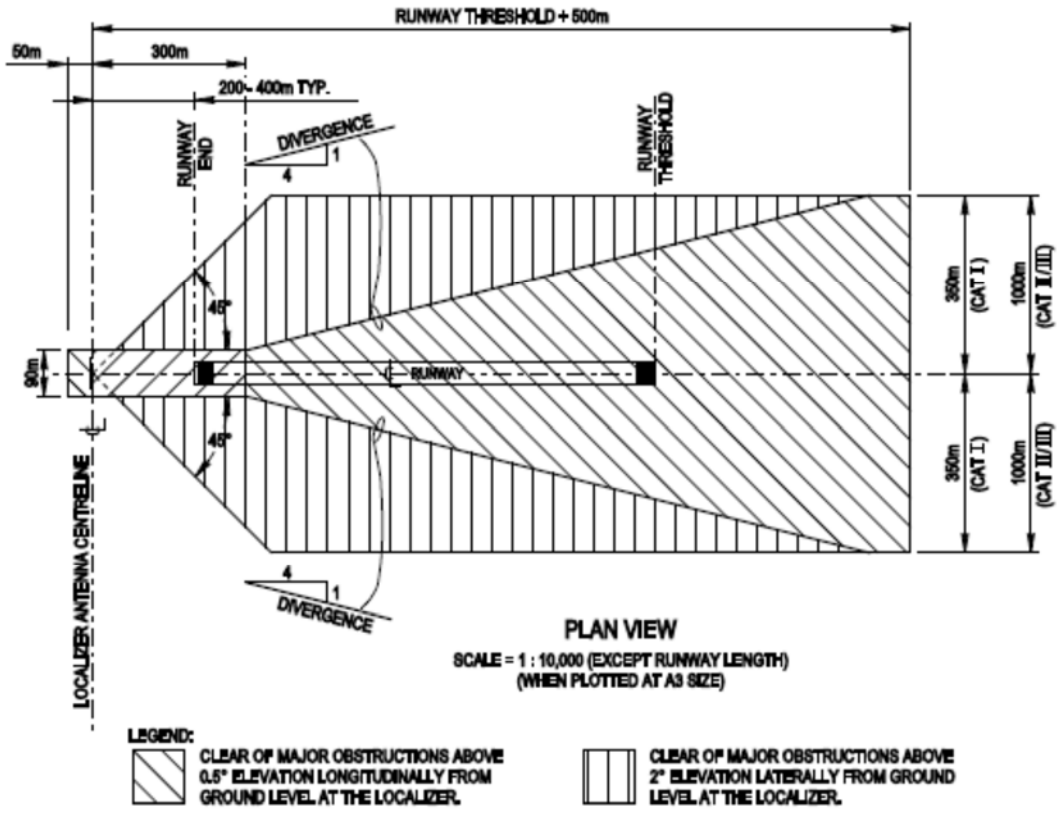
LONGITUDINAL SECTION

SCALE = 1 : 10,000 (WHEN PLOTTED AT A3 SIZE)
(NOTE: 0.5° ANGLE DRAWN 'NOT TO SCALE' FOR CLARITY)



LATERAL SECTION

SCALE = 1 : 10,000 (WHEN PLOTTED AT A3 SIZE)
(NOTE: 2° ANGLE DRAWN 'NOT TO SCALE' FOR CLARITY)



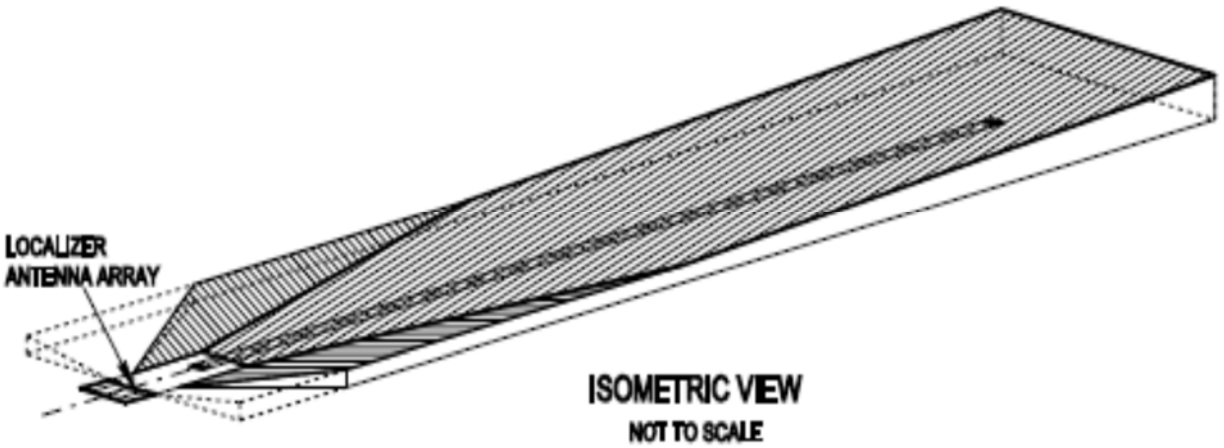
PLAN VIEW

SCALE = 1 : 10,000 (EXCEPT RUNWAY LENGTH)
(WHEN PLOTTED AT A3 SIZE)

LEGEND:

CLEAR OF MAJOR OBSTRUCTIONS ABOVE 0.5° ELEVATION LONGITUDINALLY FROM GROUND LEVEL AT THE LOCALIZER.

CLEAR OF MAJOR OBSTRUCTIONS ABOVE 2° ELEVATION LATERALLY FROM GROUND LEVEL AT THE LOCALIZER.



ISOMETRIC VIEW

NOT TO SCALE

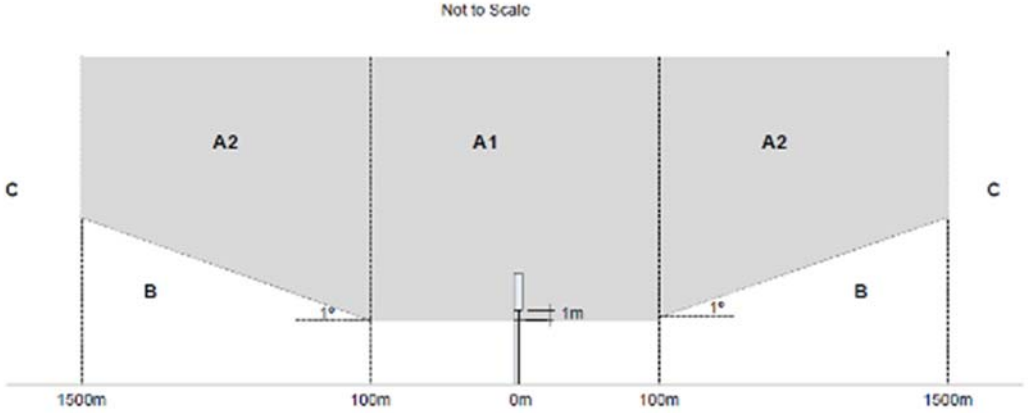
Building Restricted Areas for Aviation Facilities (Surveillance)

Automatic Dependent Surveillance-Broadcast (ADS-B) and Wide Area Multilateration

Wide Area Multilateration

59. Wide Area Multilateraton is a surveillance tool used as an alternate to radar in Tasmania. It is also used as the Precision Runway Monitor at Sydney Airport during Independent Parallel Approaches.

Building Restricted Area	Location of development	Action required
Zone A (A1)	If development is located: a. within 100 metres of the antenna; and b. above a horizontal plane located 1 metre below the base of the antenna.	All applications must be referred to Airservices Australia for assessment.
Zone A (A2)	If development is located: a. between 100-1500 metres of the antenna; and b. the height of the development will cross the A2/B zone boundary (defined as an angle of elevation of 1° measured from the above horizontal plane beneath the antenna).	All applications must be referred to Airservices Australia for assessment.
Zone B	If development is located within 1,500 metres of the antenna but the development will not cross the A2/B Zone boundary.	No requirements. Airservices Australia should be advised of proposals for large obstructions.
General guidance: • small buildings, trees, power and telephone lines and fences are permitted within 100 metres of the antenna, provided they do not project above a height of approximately 1 metre below the bottom of the antenna; • large obstructions such as multi-storey buildings, steel bridges, wind turbines etc. should be located at least 1,500 metres from the antenna due to their potential to act as a source of interference to correct operation.		



Radar Site Monitors

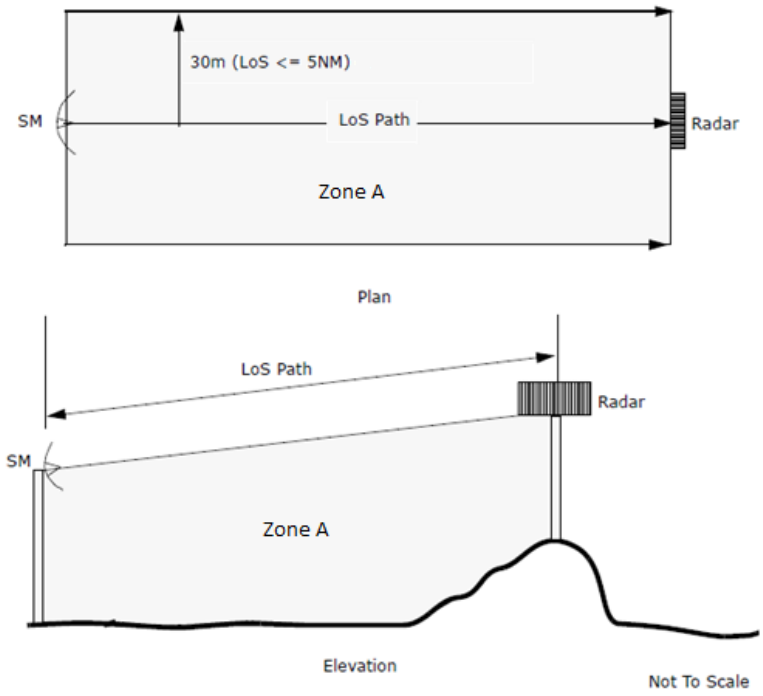
60. Radar site monitors are used to ensure the radar is operating within specified parameters. This system requires a direct line of sight to the radar and must be protected from false reflections due to surrounding developments.

Site Monitors - Type A

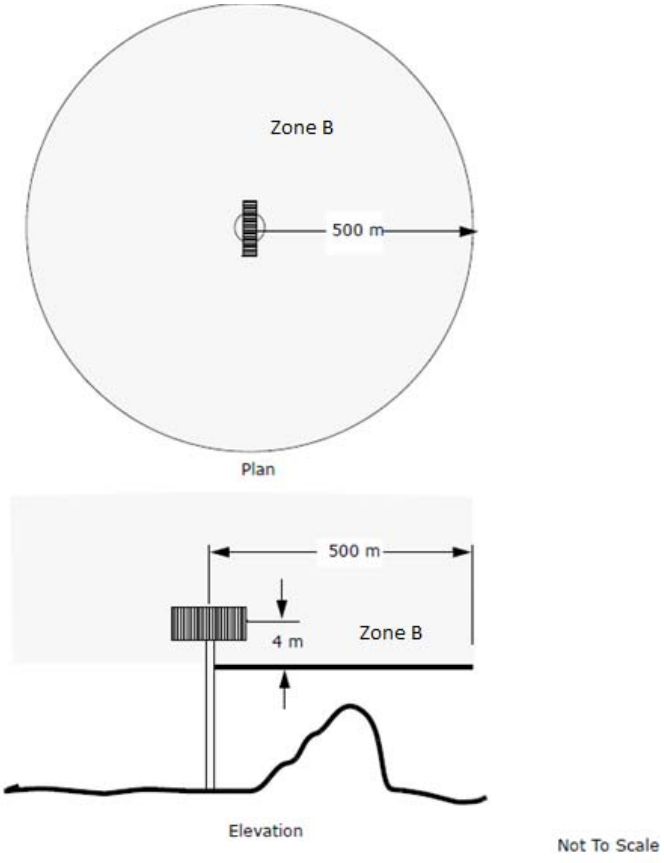
61. Type A applies for Radar to Site Monitor distances of less than or equal to 5 Nautical Miles (NM).

Building Restricted Area	Description	Action required
Zone A	If development is located: a. within 30 metres of the line of sight	All applications must be referred to Airservices Australia for assessment.
Zone B	If development is located: a. within 500 metres of the antenna; and b. above a horizontal plane located 4 metres below the base of the antenna.	All applications must be referred to Airservices Australia for assessment.
General guidance: • no temporary or permanent obstructions should infringe on Zone A; • infringements in Zone B have the potential to cause interference and shall be assessed on a case by case basis.		

Zone A:


30m (LoS <= 5NM)
SM
LoS Path
Radar
Zone A
Plan
LoS Path
Radar
SM
Zone A
Elevation
Not To Scale

Zone B:

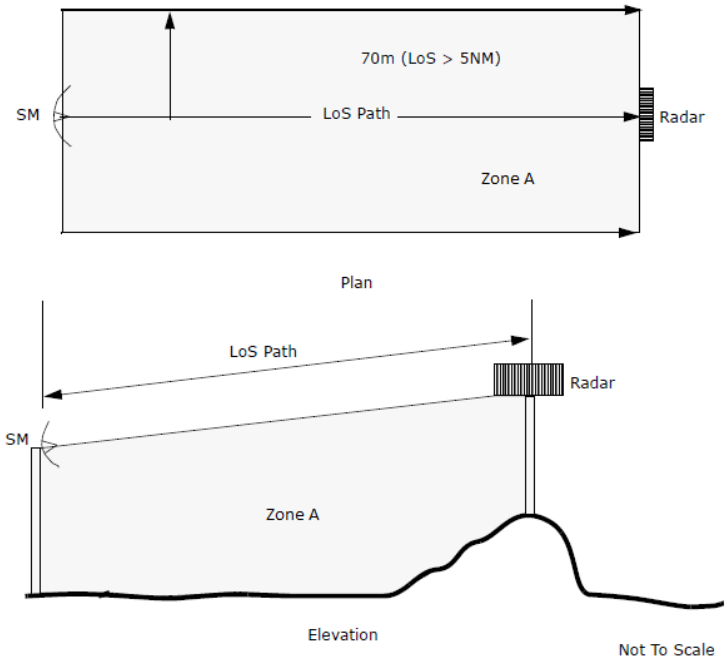

Zone B
500 m
Plan
500 m
4 m
Zone B
Elevation
Not To Scale

Site Monitors - Type B

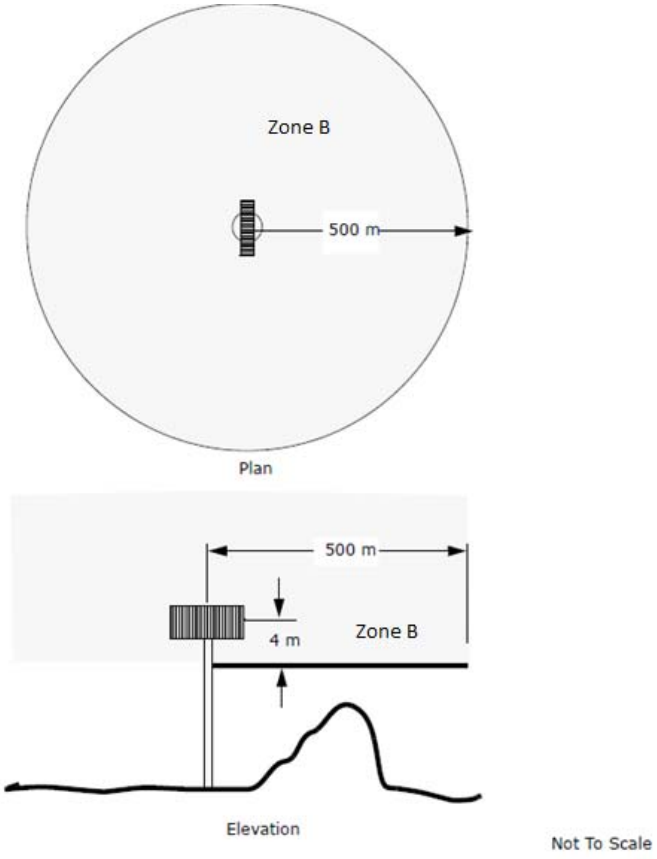
62. Type B applies for Radar to Site Monitor distances of greater than 5 NM.

Building Restricted Area	Description	Action required
Zone A	If development is located: a. within 70 metres of the line of sight.	All applications must be referred to Airservices Australia for assessment.
Zone B	If development is located: a. within 500 metres of the antenna; and b. above a horizontal plane located 4 metres below the base of the antenna.	All applications must be referred to Airservices Australia for assessment.
General guidance: • no temporary or permanent obstructions should infringe on Zone A; • infringements in Zone B have the potential to cause interference and shall be assessed on a case by case basis.		

Zone A:


70m (LoS > 5NM)
SM
LoS Path
Radar
Zone A
Plan
LoS Path
Radar
SM
Zone A
Elevation
Not To Scale

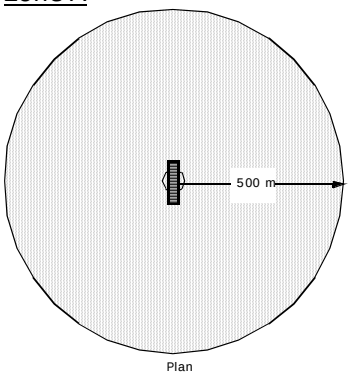
Zone B:

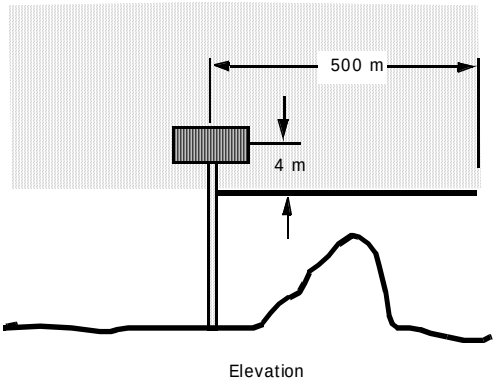

Zone B
500 m
Plan
500 m
4 m
Zone B
Elevation
Not To Scale

Primary and Secondary Surveillance Radar

Building Restricted Area	Description	Action required
Zone A	If development is located: a. within 500 metres of the antenna; and b. above a horizontal plane located 4 metres below the base of the antenna.	All applications must be referred to Airservices Australia for assessment.
Zone B	If development is located: a. within 4000 metres of the antenna; and b. the development will cross the zone boundary (defined as an elevation angle of 0.5° measured from 8 metres below the height of the radar antenna)	All applications must be referred to Airservices Australia for assessment.
Area of interest	If development is located: a. within 15 km of the antenna; and b. the height of the development will cross the zone boundary (defined as an angle of elevation of 0.25° measured from the height of the antenna)	All applications must be referred to Airservices Australia for assessment.
General guidance: • no temporary or permanent obstructions should infringe on Zone A or Zone B; • any sharp discontinuity protruding into the area of interest such as single metal light towers, power pylons and city buildings, will impact on performance and should be avoided where possible.		

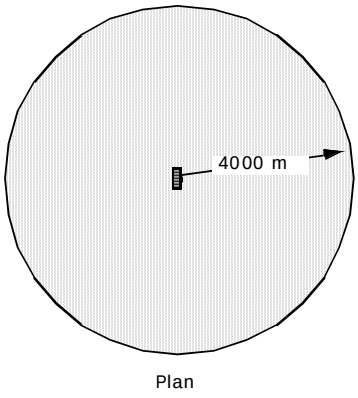
Zone A

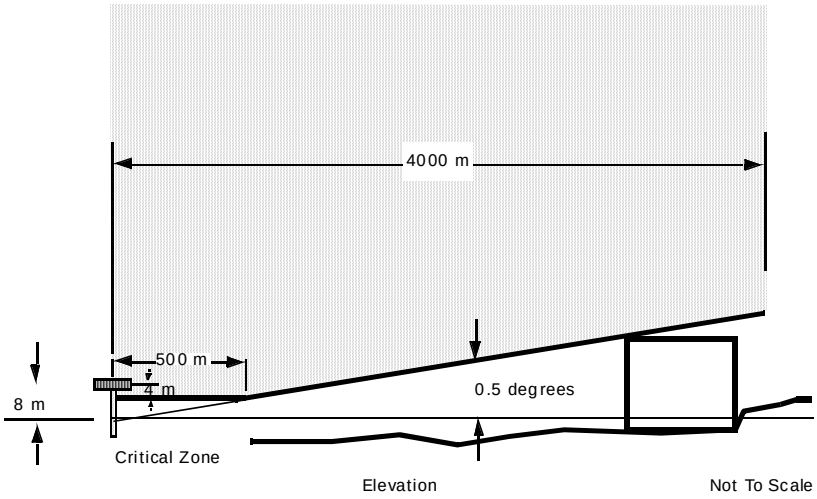




Not To Scale

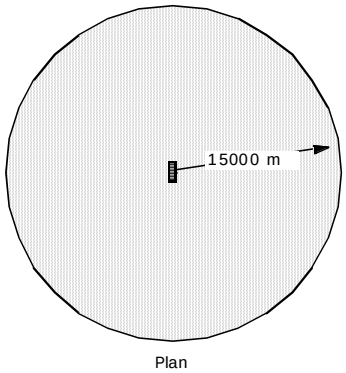
Zone B

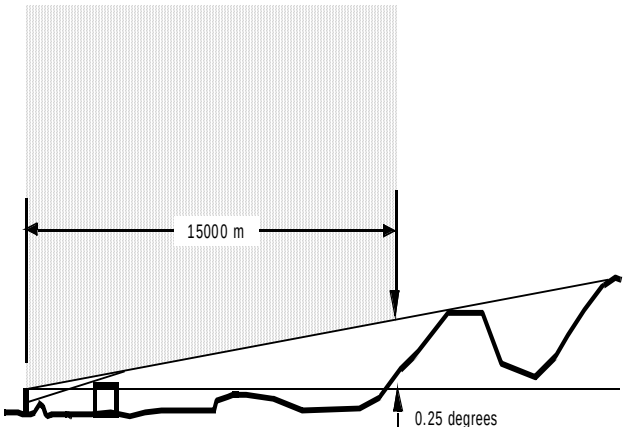




Not To Scale

Area of Interest





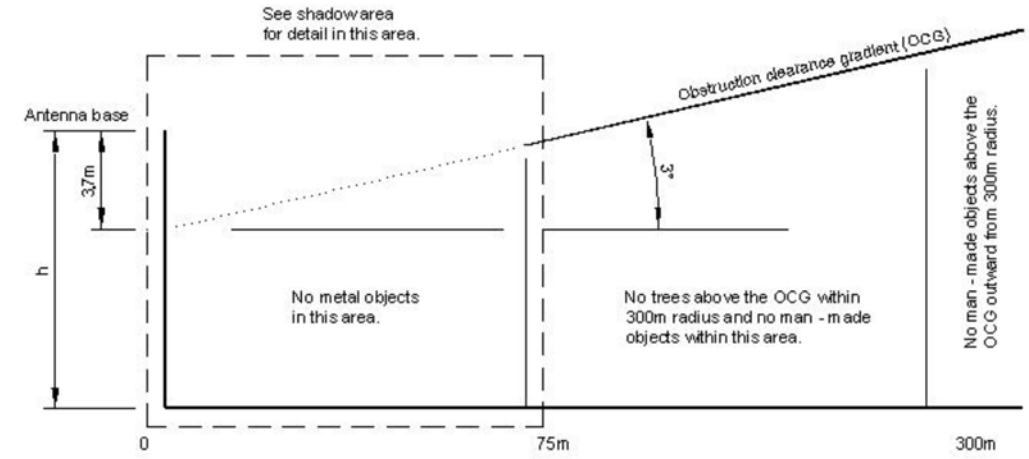
Tactical Air Navigational

63. A Tactical Air Navigational (TACAN) beacon is a fixed radio transponder which operates in the frequency range of 960 MHz to 1215 MHz. It provides the pilot of a suitably equipped aircraft with azimuth and distance information from the beacon and a periodically transmitted, aural beacon identification signal. Installations normally comprise two transponders.

Building Restricted Area	Description	Action required
Zone A & B	If development is located: a. within 75 metres of the Antenna base, at a height between 0 and ***h*** **-** 3.7metres below the antenna base; or b. within 300 metres of the site, or is to protrude through a 3º clearance cone beyond 300 metres.	All applications must be referred to Airservices Australia for assessment. Applications should be assessed against DoD AAP 7081.002. Consult Defence if *h* cannot be ascertained for the development site.

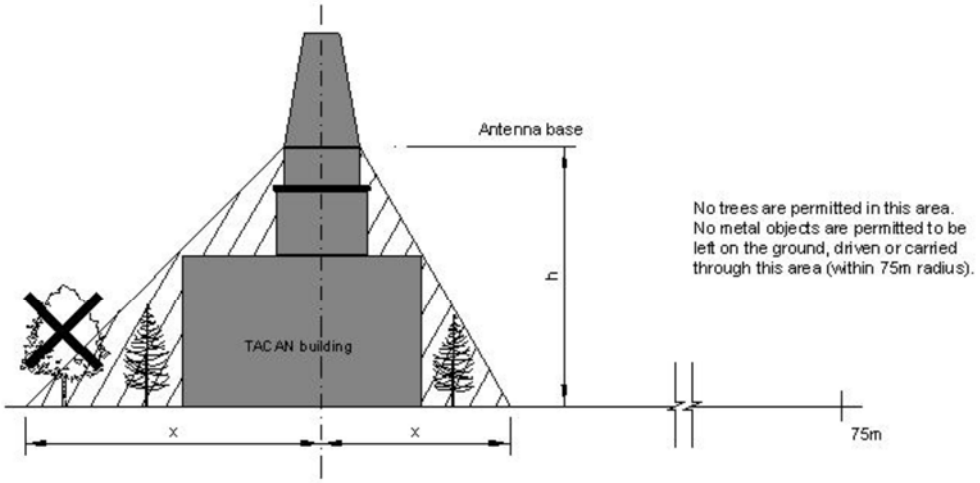
General guidance:

- No building, structure, pole or other object whether permanent or temporary, other than trees, shrubs, shrubs, hedges or other vegetation are permitted to grow beyond the height indicated by the Obstruction Clearance Gradients (OCG) in Figure 1, within a 75 m radius of the aerial.
- No metallic objects are to be placed or left on the land within 75 m radius of the antenna, other than within a radius of 5 m of the site or within the shadow area below a line from the base of the antenna.
- In exceptional circumstances, scattered single obstructions or minor groups of obstructions not exceeding one degree in width may protrude above the 3º clearance cone. Objects greater than one degree in width and protruding through the clearance cone present an obstruction affecting TACAN coverage.
- No overhead or surface metallic cable or pipe is to be carried or laid over the land within 300 m of the site, or is to protrude through a 3º clearance cone beyond 300 m. Metallic cables and pipes are permitted within 300 m provide they are installed as follows:
    a. buried to a depth IAW with Australian Standards;
    b. approach the building on an antenna centre point radial from a minimum distance of 150 m or in the case of hill-top sites 75 m;
    c. power and control/telephone lines or cables buried to a depth IAW with Australian Standards; and
    d. in the case of hill-top sites, power and control lines may be run overhead to within 75 m of the antenna provided that within 225 m they run on a radial from the antenna centre point and do not protrude above a horizontal plane formed by projecting the floor of the TACAN building.
- To avoid the possibility of interference to the TACAN receivers, overhead high tension lines and sub-stations should be kept clear of the site by at least the following distances:
    a. 2 kV to 22 kV : 370 m, and
    b. above 22 kV : 950 m.



h = height of antenna base

OBSTRUCTION CLEARANCE GRADIENT - 3°



x = 5.0m or shadow distance whichever is greater

SHADOW AREA

Note: The height at *h* will vary at each TACAN site.