ENR 1.6 ATS SURVEILLANCE SERVICES AND PROCEDURES

1 GENERAL

1.1 Services Provided

1.1.1 ATS Surveillance services are provided by means of primary surveillance radar (PSR), secondary surveillance radar (SSR), automatic dependent surveillance — broadcast (ADS-B) and multilateration (MLAT) systems.

1.1.2 Pilots should note that a radar information service cannot provide collision avoidance information on aircraft that:

(a) do not have an operating transponder, or are not transmitting altitude information; and

(b) inadvertently penetrate transponder mandatory controlled airspace beyond the range of the associated PSR.

1.1.3 In the event of failure of an associated PSR, the limitations noted in 1.1.2 will also apply in the following airspace:

(a) Auckland, Wellington, and Christchurch CTA/C and CTR/C;

(b) Woodbourne CTA/D; and

(c) Whenuapai and Woodbourne CTR/D.

1.1.4 Limitations of service will be advised by NOTAM.

2 SURVEILLANCE PROCEDURES

2.1 Transponders

2.1.1 Transponders allow positive aircraft identification and altitude information to be displayed to air traffic control. This enables controllers to quickly determine where potential conflicts could occur.

2.1.2 In addition, operation of transponders at all times increases safety when operating in the vicinity of ACAS equipped aircraft, and will enhance Search and Rescue and emergency action when operating within surveillance cover.

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2.1.3 Adherence to transponder operating procedures provides both VFR and IFR aircraft with a higher degree of safety and reduces communications, giving a more efficient service.

2.1.4 An aircraft equipped with Mode S which has an aircraft identification capability must transmit the aircraft identification as specified in Item 7 of the ICAO flight plan or, when no flight plan has been filed, the aircraft registration.

2.1.5 Aircraft equipped with Mode S must include the Mode S address in Item 18 of the flight plan e.g. CODE/C81111. Aircraft will be required to obtain prior approval from Airways to access controlled airspace without operative or the required surveillance equipment and enter into Item 18 of the flight plan:

- RMK/ATC APPROVED ADSB/SSR OFF/NEGATIVE/UNSERVICEABLE (as appropriate); or
- RMK/ADSB/SSR EXEMPT (as appropriate) if subject to a CAA exemption

2.1.6 ATC must verify with the pilot at least once during the flight that the altitude information received from the transponder is correct, prior to using that information for separation purposes.

2.1.7 ATC will receive an alert where the selected level entered into the mode control panel/flight control unit of an enhanced surveillance (EHS) Mode-S equipped aircraft does not match the cleared level issued by the controller or intermediate level contained in the departure and/or route instructions or SRC. ATC will advise the aircraft of the discrepancy, e.g.

"FASTAIR 927 CHECK SELECTED LEVEL. CLEARED LEVEL IS 10,000 FT"

2.2 System of SSR Code Assignment

SSR Code Allocation

2.2.1 SSR codes are allocated by ATS facilities to controlled flights operating within their area of responsibility, and to controlled flights entering the New Zealand FIR from the Auckland Oceanic FIR.

2.2.2 Codes for use in New Zealand are allocated in accordance with international agreements and instructions contained in the Manual of Air Traffic Services.

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2.2.3 The pilot operating an aircraft, not in a formation, in transponder mandatory controlled airspace must set the transponder:

(a) to the appropriate code assigned by ATC for the flight; or

(b) if not assigned a code by ATC, in accordance with Table ENR 1.6-1; or

(c) if an in-flight emergency, loss of communications, or an unlawful interference occurs, in accordance with Table ENR 1.6-2.

2.2.4 RPAS operators may be required to set the RPA transponder to 1600 in accordance with a CAR Part 102 Unmanned Aircraft Operating Certificate. The requirement may apply to operations in Class G airspace, irrespective of whether the airspace is transponder mandatory, or for operations in controlled airspace where ATS have not issued a discrete SSR code.

Table ENR 1.6-1
Transponder Code Allocation

Flight Rules	Type of Aircraft	SSR Code
IFR including Flight Rules Y and Z	Within Auckland Oceanic FIR:	
	Departing New Zealand FIR	Code assigned on departure
	Inbound to or overflying New Zealand FIR	Last code assigned, or 2000
	Within New Zealand FIR	Code assigned, or 2000
VFR	Fire suppression and reconnaissance (fixed wing and helicopters)	0111
	Civil aeroplanes other than gliders	1200
	Gliders and balloons	1300
	Aircraft in General Aviation Areas	1400
	Civil helicopters	1500
	RPAS (CAA approval required)	1600
	Within Auckland Oceanic FIR	2000
	Aircraft operating in aerodrome traffic circuit at controlled aerodromes	2200
	Defence aeroplanes	6000
	Defence helicopters	6500

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Table ENR 1.6-2
Emergency SSR Codes

Occurrence	SSR Code
Unlawful interference	7500
Loss of radio communication	7600
In-flight emergency when no code has been allocated by ATC	7700

Formation SSR Codes and Procedures

2.2.5 An individual SSR code may be assigned to each aircraft in the formation.

2.2.6 Military aircraft in formation should be assigned a code where the last number of the code corresponds to the aircraft's formation number, e.g. TEXGLD 2 – 6302.

2.2.7 For civil formations or military formations not using the above codes, a discrete code will be assigned to the formation leader, and all other aircraft in the formation will be assigned code 2020.

2.2.8 Unless otherwise instructed by ATC, only the leader is to squawk NORMAL and all other aircraft in the formation are to squawk STANDBY. This does not prohibit ATC from asking all aircraft in the formation to squawk NORMAL.

2.2.9 Where members of a formation have been instructed by ATC to squawk STANDBY the formation leader must advise ATC immediately there is a relaxation or significant change (laterally or vertically) to the formation's configuration. This is to enable ATC to re-evaluate separation requirements between the aircraft in the formation and other aircraft.

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2.3 Controlled Airspace Transponder Procedures for Pilots

2.3.1 The use of transponder and altitude reporting equipment is prescribed in CAR 91.247 and 91.255.

2.3.2 Pilots must operate transponders in accordance with ATC instructions and must acknowledge by reading back code setting instructions.

2.3.3 Pilots must not operate the "IDENT" feature unless instructed by ATC.

2.3.4 Where an aircraft transmits ADS-data which is below the minimum standard prescribed by Notice 91.258, an alert will be generated by the ATS surveillance system.

2.3.5 ATS may advise the PIC of an aircraft being provided with a surveillance service of the degraded ADS-B information, and the pilot may be instructed to switch transponders (if able) to remedy the issue. If this is unsuccessful, the pilot may be asked to stop ADS-B transmissions and transmit Mode S information only, if able, or if required, to turn off the transponder.

Note 1 — Guidance for the installation and airworthiness approval of ADS-B OUT systems in aircraft are available in Notice 91.258.

Note 2 — Aircraft systems may provide a degraded ADS-B alert.

2.3.6 Aircraft equipped with ADS-B which has an aircraft identification capability must transmit the aircraft identification as specified in Item 7 of the ICAO flight plan or, when no flight plan has been filed, the callsign or aircraft registration being used for the flight e.g. ABC123 as per the flight plan, WPR01 (Westpac Rescue 01 VFR and not on a flight plan) or ZKABC (aircraft registration) callsign being used for flight.

2.3.7 An aircraft equipped with ADS-B may transmit emergency status messages. Selection by an aircraft of an emergency transponder code (e.g. 7600) automatically generates an emergency indication in the ADS-B message:

(a) Emergency;

(b) Communication failure; or

(c) Unlawful interference.

2.3.8 Due to the emergency processing limitations of legacy DO260 ADS-B systems (TSO-C166) which may be used when installed prior to 31 December 2018, if the aircraft is in ADS-B only coverage area, the pilot will need to communicate the nature of the emergency with air traffic service.

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General

2.3.9 The pilot of an aircraft who has received specific instructions concerning the transponder setting, or who is operating a VFR code in transponder mandatory controlled airspace, must, unless complying with emergency procedures, maintain that setting until otherwise advised by an ATS unit.

IFR

2.3.10 All aircraft on an IFR flight plan will receive a specific, discrete transponder code for that flight as part of an ATC clearance.

2.3.11 The pilot of an IFR aircraft flying in the New Zealand FIR, but not yet in receipt of an ATC clearance, must set code 2000.

2.3.12 The pilot of an IFR aircraft flying in the Auckland Oceanic FIR must set code 2000 unless a specific transponder code has been specified by an ATS unit.

VFR

2.3.13 A limited number of transponder codes are available for allocation to VFR aircraft on cross-country flights. When filing a VFR flight plan via IFIS, the pre-allocated code will be shown in the message acknowledging acceptance of the filed flight plan. When filing via FAX or by phone with the National Briefing Office, no acknowledgment of a pre-allocated code will be made.

2.3.14 For Non ADS-B or Mode S aircraft only an application for permanent codes must be made to the National Briefing Office.

2.3.15 The pilots of all VFR transponder equipped aircraft, whether on flight plan or not, who have been assigned a discrete aircraft or ATC code, should operate that code at all times, unless otherwise instructed by ATC, or when an emergency SSR code is required. The pilots of other VFR aircraft should set the code indicated in Table ENR 1.6-1.

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Unlawful Interference

2.3.16 The pilot of an aircraft which is being subjected to unlawful interference, or the threat of unlawful interference, must endeavour to advise ATS of the fact, together with details of any subsequent deviation from the current flight plan and any other significant factors affecting the operation. This enables ATS to give priority to the aircraft and to alert organisations likely to be involved. The following procedures should be followed:

(a) squawk CODE 7500 MODE A;

(b) advise ATS of details in plain language if possible;

(c) if unrestricted use of the radio is not possible, insert the phrase

"CHANNEL SEVEN FIVE ZERO ZERO" into any RTF transmission after the aircraft's callsign if it is safe and practicable to do so.

2.3.17 Whenever it has been established that an aircraft is transponding on code 7500 the controller will attempt to verify by RTF with the aircraft concerned that the code selection is intentional:

" ... (CALL SIGN) ... CONFIRM SQUAWKING SEVEN FIVE ZERO ZERO".

2.3.18 If the aircraft is not being subjected to unlawful interference, the pilot should respond to the query by broadcasting that the aircraft is not being subjected to unlawful interference.

2.3.19 If the reply is in the affirmative or if no reply received, this will indicate the aircraft is subjected to unlawful interference.

2.3.20 ATS personnel recognising any indication of unlawful interference to an aircraft will attend promptly to its request. Information pertinent to the safe conduct of the flight will continue to be transmitted and action will be taken to facilitate the conduct of all phases of flight.

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Transponder Setting Procedure

2.3.21 ATS radar units are equipped with alarm systems that activate when the aircraft is within surveillance coverage and the pilot selects the unlawful interference (code 7500), communication failure (code 7600), or emergency transponder code (code 7700). Selection of these codes will automatically select a corresponding ADS-B message in suitably equipped aircraft.

2.3.22 It is possible to unintentionally select these codes momentarily when changing the transponder from one code to another. To prevent unnecessary activation of the alarm, pilots should set transponders to "STANDBY" while changing transponder codes.

Note: ADS-B and SSR are linked in many aircraft and the selection of Standby Mode will inhibit ADS-B transmissions as well as SSR interrogation replies.

Use of Standby/On/Off

2.3.23 Pilots must set transponders to the applicable mode before taxiing and to OFF when the aircraft has come to a complete stop at the end of the flight.

2.3.24 When turning the transponder on, ensure that the altitude (ALT) selection is made allowing transmission of Mode A (selected code) and Mode C (altitude) data.

2.3.25 Pilots of aircraft operating in the circuit of a controlled aerodrome should only set transponders to "STANDBY" when instructed by ATC, or when such an instruction is included on the aerodrome chart.

2.3.26 Special procedures apply at Auckland INTL; refer Auckland Ground Movements (2) — ALL RWY page.

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Use of Transponder Altitude for Vertical Separation

2.3.27 When reporting levels under routine procedures or when requested by ATC, pilots must state the current altimeter reading to the nearest 100 ft. This enables the verification of Mode C/ADS-B data transmitted by the aircraft.

2.3.28 If there is a difference of more than 200 ft between the transponder level readout and the reported level, the pilot will be advised to check the altimeter setting. If the difference continues the pilot will be instructed to switch off transponder altitude.

2.3.29 After verification, transponder altitude may be used by ATC to ascertain:

(a) that aircraft are maintaining assigned levels; or

(b) that aircraft have vacated, passed, or reached a level.

2.3.30 Unverified transponder altitude data will not be used for vertical separation.

ACAS Procedures

2.3.31 Alerts generated by an ACAS (such as TCAS) are being experienced despite correct ATC separation being applied or there is adequate vertical and/or horizontal distance between the aircraft.

2.3.32 Following are suggestions for reducing the number of these alerts:

(a) High performance aircraft in the climb or descent should reduce their rate of climb or descent for the last 1000 ft prior to cleared altitude. "Adjust vertical speed" advisories should be followed.

(b) Aircraft operating at the lowest IFR cruising level within controlled airspace will be only 500 ft above the upper limit of uncontrolled airspace. Aircraft should review operations at this level if VFR traffic is in the vicinity.

(c) When operating by visual reference within, or entering a controlled aerodrome traffic circuit, pilots should operate an ACAS on Traffic Avoidance (TA) mode. This is to avoid unnecessary Resolution Advisory (RA) manoeuvres against controlled traffic where visual, composite visual, 500 ft vertical or runway separation standards that are not considered by an ACAS as being applied. This advice also applies when operating in proximity to uncontrolled aerodromes.

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2.4 Transponder Failure/Special Procedures

2.4.1 Flights will not be permitted to enter transponder mandatory controlled airspace without the required surveillance equipment unless specifically approved by ATC. In certain cases CAA approval may also be required.

2.4.2 Approval to continue to operate within controlled airspace may be granted to flights experiencing partial or complete transponder failure as follows:

(a) If the failure is partial, every effort will be made to allow the flight to continue with minimum restriction to its final destination and thereafter to an appropriate repair base.

(b) If the failure is complete, the flight is likely to experience some restrictions whilst enroute to the initial destination and may not be allowed to proceed to subsequent destinations via transponder mandatory airspace until transponder repair is effected. If a repair facility is not available at the initial destination then special approval may be given for the flight to proceed via transponder mandatory airspace to an appropriate repair base. Transit to the appropriate repair base may be restricted to periods of low traffic density with possible use of alternative routes to avoid areas of high traffic density.

(c) A Ground Mode alert, where the aircraft's transponder does not switch from ground to air mode, will be handled by ATC as a complete transponder failure. ATC will advise when the transponder indicates a Ground Mode alert.

2.4.3 ATC recognises the economic penalties that operators could face and will be as flexible as safety permits in granting special approval.

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2.5 Transponder Testing

2.5.1 Operational testing of transponders should, if possible, be carried out only in shielded areas or under controlled conditions. Transmissions from transponders operating in Mode A and C under test may be interpreted by ATC radar and aircraft ACAS as stationary aircraft, thereby giving false alerts to controllers and pilots respectively. Transmissions from transponders under test cannot be filtered out by these systems.

2.5.2 If transponder testing in Mode A and C is required to take place in unshielded conditions the following applies:

(a) Notify the nearest ATC unit of the intention to test transponders, giving time period involved;

(b) Unless a specific code has been issued for use, operate the transponder on codes 0050 – 0057;

(c) When testing Mode C output, if possible set to 40,000 ft or above. ATC may request a delay where testing may impact on traffic management.

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3 ATS Surveillance Services

3.1 Radar Control Service

3.1.1 Radar control service, including radar advisory and information services, is provided by the:

(a) Auckland Air Traffic Control Centre; and

(b) Christchurch Air Traffic Control Centre.

3.1.2 Radar control is only provided in controlled airspace.

3.1.3 Radar services use information derived from ADS-B, PSR, SSR or MLAT systems.

3.2 Availability

3.2.1 The availability of a radar control service can be affected by controller workload limitations. Consequently, the radar controller is responsible for determining the extent of service that can be provided at a particular time. The provision of radar control has priority over the provision of a radar advisory or information service.

3.2.2 Where available, surveillance is used to the maximum extent practicable in the provision of area and approach control services. Accordingly, when within surveillance cover, identified controlled flights may expect to be under surveillance control. ATC units providing area surveillance control services use the word "CONTROL" in their callsign. ATC units providing approach surveillance control services use the word "APPROACH" in their callsign. When a specific radar service is being provided on a discrete RTF frequency, the service will be identified by including the word "RADAR" in the callsign.

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3.3 Identification of Aircraft

3.3.1 Before taking any action based on surveillance information, the radar controller will establish identification of the aircraft concerned and identification will be maintained until termination of the surveillance service.

3.3.2 Identification will be achieved by such methods as:

(a) requiring the aircraft to carry out clearly defined manoeuvres;

(b) correlating a particular radar position symbol with an aircraft reporting its position by reference to navigation aids or a visual fix;

(c) requiring aircraft to set a particular SSR Code or SQUAWK IDENT;

(d) direct recognition of the aircraft identification in an ADS-B label; or

(e) in the case of departing aircraft, observing the aircraft in the correct position in relation to the take-off runway shortly after take-off.

3.3.3 The pilot will be advised when identification has been achieved and, if identification is subsequently lost, the pilot will be advised accordingly.

3.4 Radar Services to IFR Flights

3.4.1 Radar Control and Radar Flight Information Services, as appropriate, are provided to IFR flights within radar coverage in **Class A, C, and D** airspace.

3.4.2 A radar FIS service is provided to IFR flights in **Class G** airspace within radar coverage.

3.5 Radar Services to VFR Flights

3.5.1 Radar Control, radar advisory and radar information services, as appropriate, are provided to VFR flights under area radar or approach radar control within radar coverage in **Class C** and **Class D** airspace.

3.5.2 Radar services are not normally provided to VFR flights within radar coverage operating in **Class G** airspace. Every effort will be made to provide a service if requested, but it will be limited to:

(a) assisting aircraft experiencing an emergency; or

(b) giving navigational assistance; or

(c) Flight Path Monitoring for aircraft crossing Cook Strait.

3.5.3 The use of radar by ATC does not absolve the pilot from compliance with the requirements for operation under VFR. Terrain clearance remains the responsibility of the pilot.

3.5.4 Should pilots operating under VFR encounter a situation where their ability to remain clear of terrain is compromised, any requests for assistance from ATS must include details of the circumstances.

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3.6 Radar Control

3.6.1 Radar control is the term used to indicate that radar derived information is employed directly in the provision of an ATC service.

3.7 Radar Vectoring

3.7.1 Radar vectoring occurs when the radar controller instructs the pilot to steer magnetic headings that will enable an aircraft to maintain a desired track. To minimise the amount of navigation under radar control, and to facilitate the restoration of pilot navigation in the event of radar failure, aircraft will, when practicable, be vectored on routes that can be related to a pilot interpreted navigation aid.

3.7.2 Headings will be passed by using the word "HEADING" followed by the three digits of the magnetic heading. Where a pilot is required to turn through 180 degrees or more the direction of turn will be emphasised by repeating it.

3.7.3 Instructions given by radar controllers will often be designed to establish and maintain radar separation as well as to position aircraft accurately. Pilots must therefore commence a turn immediately the instruction is given at a bank angle of 25° or at a turn rate of 3° per second (Rate 1), whichever requires the lesser angle of bank, and maintain any given heading until otherwise instructed.

3.7.4 When an aircraft is diverted from a previously assigned route, the pilot will be advised, unless it is self-evident, of the purpose of the vector. Whenever possible, the limit of the diversion will be specified.

3.7.5 When an IFR aircraft is being vectored, the radar controller is responsible for provision of adequate terrain clearance, and ensuring the aircraft remains within controlled airspace except in an emergency.

3.7.6 When radar vectoring is terminated, other than on the issuance of an approach clearance, the pilot will be instructed to resume own navigation. When necessary, the radar controller will pass position or track and distance information to assist the pilot to return the aircraft to its cleared route.

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3.8 Use of Surveillance in Control Towers

3.8.1 All control towers have the capability to display surveillance derived information in support of an aerodrome control service, and approach procedural control service if provided. Traffic displayed depends on the surveillance coverage in the area.

3.8.2 The prime responsibility of aerodrome control is the visual control of airborne aircraft in the vicinity of the aerodrome, and all traffic on the manoeuvring area. Approach procedural control responsibility is for the provision of an ATC service by non-surveillance means to aircraft arriving, departing, and transiting the control zone and any associated control area.

3.8.3 Aerodrome control and approach procedural control may use surveillance information to observe the position of aircraft for improved situational awareness and to reduce RTF transmissions.

3.8.4 ATC surveillance service is NOT provided by non-radar ATC units. Therefore at a control tower where an aerodrome control service, or aerodrome/approach procedural control service is provided, aircraft are not continuously monitored on surveillance displays.

Surface Movement Surveillance

3.8.5 A surface movement surveillance system using MLAT is installed at Auckland aerodrome. MLAT relies on aircraft operating transponders at all times when moving on the aerodrome.

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3.9 Speed Requirements Under Radar Control

3.9.1 To facilitate radar control and to reduce the need for radar vectoring, a radar controller may request aircraft to adjust speed in a specified manner. Pilots must comply with any speed instructions unless they are considered unacceptable for safety reasons, in which case ATC must be notified immediately and pilot preferred speed stated.

3.9.2 When speed control is required, it will be applied in a positive manner whereby the controller will allocate a specific speed, a maximum speed, or a minimum speed to be flown. Speed should be maintained to within 10 kt of the speed required by ATC.

3.9.3 Speed control will not be applied where severe turbulence is known to exist.

3.9.4 Specific speeds will normally be expressed in multiples of Mach 0.01 or 10 kt, expressed as IAS.

3.9.5 Part 91 prescribes maximum speeds for IFR flights in classes D and G airspace, and VFR flights in classes C, D and G airspace. These speed requirements cannot be cancelled by ATC.

Phraseologies

3.9.6 The phraseologies in Table ENR 1.6-3 may be used.

Table ENR 1.6-3
Phraseology used for Radar Speed Requirements

"REPORT SPEED"	Request for current IAS.
"REPORT MINIMUM APPROACH SPEED"	Request for the minimum speed a pilot is able to fly on an instrument approach to a 5 NM final.
"REDUCE SPEED TO (number)KT"	Instruction that requires a reduction in speed to a specified IAS as quickly as practicable, and for that speed to be maintained until modified or cancelled by ATC.
"FLY (number)KT OR LESS TO FL(number)"	Instruction that requires a specified maximum IAS until reaching/ passing a specified FL.
"MAINTAIN (number)KT TO (number) DME"	Instruction that requires a pilot to increase or decrease to, and maintain, a specified speed to a certain point.

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Arriving Aircraft

3.9.7 Mandatory speed requirements for arriving IFR aircraft are published in AD 2. ATC may amend or cancel published ATC speed requirements.

3.9.8 The phraseology "*NO [ATC] SPEED RESTRICTIONS*" will be used by a radar controller to cancel:

(a) the requirement for maximum 250 kt IAS below 10,000 ft within 30 NM of Auckland, Wellington or Christchurch International airports; and

(b) speed requirements published on STAR charts within the AA, CH and WN TMAs; and

(c) any published ATC speed requirement(s) on an instrument approach.

3.9.9 The pilot will be advised when there is a limit on the cancellation of speed restrictions. For example: *"NO [ATC] SPEED RESTRICTIONS TO (point/location)"*

3.9.10 A radar controller will not apply speed control after an aircraft on instrument approach has passed a point 5 NM from touchdown, or after an aircraft on visual approach has passed a point 4 NM from touchdown.

3.9.11 Unless otherwise specified, a clearance for a visual approach terminates any ATC speed requirement in place including published requirements being complied with or yet to be acted upon.

Speed Control Clearance Limit

3.9.12 The pilot will be advised when or where a speed requirement is no longer required. The phraseology "*CANCEL SPEED RESTRICTION*" will be used.

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3.10 Navigation Assistance

Within Controlled Airspace

3.10.1 If an identified controlled flight is observed by the radar controller to deviate significantly from its intended route or designated holding pattern, the pilot will be advised accordingly. If requested by the pilot, or if, in the opinion of the radar controller, such deviation is likely to affect the control being exercised, the aircraft will be radar vectored back onto its correct track.

Within Uncontrolled Airspace

3.10.2 The pilot of an aircraft operating in uncontrolled airspace within radar cover may request the assistance of a radar controller to confirm the aircraft's navigation. This can take the form of:

(a) confirmation that the current track will keep the aircraft clear of controlled or special use airspace;

(b) confirmation that the current track to/from a specified location is correct;

(c) a request for distance to/from a location;

(d) a request for the track to/from a location; or

(e) any other such navigational information as required.

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3.11 Direct Routing

3.11.1 A pilot may request direct routing to a navigation aid, fix (including those that are part of an instrument approach), or significant/reporting point. Traffic permitting, ATC may offer more direct routing within controlled airspace to facilitate traffic management or obvious time savings. Pilot requests will only be acceded to when traffic flows will not be compromised. Direct routing to intermediate points may be offered by ATC where the whole route is not available.

3.11.2 Unless being radar vectored, the pilot is responsible for navigation. When within radar coverage ATC will monitor the aircraft's track to ensure the flight remains within 5 NM of the agreed route.

3.11.3 Within controlled airspace ATC will provide separation from special use airspace.

3.11.4 Within controlled airspace obstacle clearance will be provided by ATC. This will be based on:

(a) radar terrain when under radar control; or

(b) at or above 13,000 ft (FL160 in the Mt Cook area); or

(c) an approved area MSA.

3.11.5 ATC direct routing responsibility ceases when:

(a) the aircraft crosses the navigation aid, significant/reporting point, or fix within controlled airspace that the aircraft has been cleared to; or

(b) the pilot reports established on a promulgated route or procedure; or

(c) the pilot reports established on an instrument approach; or

(d) the aircraft vacates controlled airspace.

3.11.6 The pilot of an aircraft using GNSS equipment as a primary means of navigation is permitted routing on unevaluated routes outside controlled airspace in accordance with relevant CAR.

3.11.7 ATC is not responsible for the obstacle clearance or navigation of IFR flights outside controlled airspace.

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3.12 Terrain Clearance — IFR Flights

3.12.1 When providing radar control, ATC will assign levels that provide terrain clearance in accordance with:

(a) contour levels depicted on radar displays that provide at least 1000 ft (2000 ft over designated mountainous zones or 3000 ft over Volcanic Hazard Zones at Alert Level One) vertical clearance from obstacles within 5 NM (3 NM within the areas of reduced radar separation detailed in 3.13) of any position within the contour; or

(b) the MSA for the route or procedure being flown, including Enroute descent (Distance) or VORSEC chart steps; or

(c) an approved area MSA; or

(d) the altitude quoted on the 25 NM minimum sector altitude diagram as shown on Instrument Approach and STAR/Arrival charts; or

(e) the altitude quoted on a Terminal Arrival Altitude (TAA) diagram as shown on Instrument Approach and STAR/Arrival charts.

3.12.2 Notwithstanding the previous paragraph, in VMC by day an IFR flight arriving or departing under radar control may be permitted to arrange its own terrain clearance. In such instances the radar controller will instruct the pilot to "*MAINTAIN TERRAIN CLEARANCE VISUALLY*".

3.12.3 Whenever a clearance or a number of clearances are issued to an aircraft subject to a radar terrain contour map, the pilot will be advised in the first transmission only that terrain clearance is being sourced from the radar terrain contour map. The following phrase will be appended to the clearances: "...*RADAR TERRAIN*".

3.12.4 A departing aircraft may be cleared to make a visual departure onto a specified heading or track, in which case the altitude at which terrain clearance responsibility passes from the pilot to the controller will be specified as part of the clearance.

3.12.5 It is the responsibility of a pilot who is cleared to maintain terrain clearance visually to ensure obstacle clearance is maintained until an alternative procedure applies, or to a specified limit, or until the aircraft has landed.

3.12.6 Pilots must be aware that the navigational tolerance used to define the MSA may not be valid if, when descending below MSA while maintaining terrain clearance visually or descending in accordance with levels assigned from the radar terrain clearance chart, utilisation of the primary means of navigation cannot be continued.

3.12.7 Before vectoring a departing flight towards rising ground the radar controller will, when necessary, obtain confirmation from the pilot that the climb performance of the aircraft will be adequate to maintain the required terrain clearance.

3.12.8 Radar vectoring of a departing flight will not be terminated until the aircraft is at or above the MSA for the route.

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Minimum Safe Altitude Warning (MSAW)

3.12.9 Minimum Safe Altitude Warning (MSAW) is a safety net system to assist in the prevention of controlled flight into terrain (CFIT) by generation of a warning to controllers of actual or predicted infringements of defined obstacle clearance surfaces (obstacle clearance polygons). It is a function of the radar data processing element of the ATM system and utilises Mode C level information from aircraft.

3.12.10 System configuration is designed to provide protection where it is most appropriate within the constraints of the system capability. These constraints include SSR coverage and performance, controller workload and the ability of the controller receiving the alert to promptly communicate with the affected pilot.

3.12.11 MSAW may be deselected at any time for servicing, or when suitable QNH data is not available, or in the event that radar anomalies or other circumstances generate numbers of "nuisance" alerts to the extent that the primary functions of ATC are compromised.

3.12.12 The system is configured to provide alerts for IFR flights **within operative controlled airspace** under the following conditions:

(a) Radar control services are being provided.

(b) General terrain monitoring in terminal airspaces where reliable SSR coverage extends to within approximately 1000 ft of ground level.

(c) Instrument Approach Path monitoring to within 2 NM of a runway threshold provided SSR coverage exists.

(d) Monitoring will be suppressed for aircraft on visual manoeuvres, and aircraft vacating controlled airspace.

3.12.13 **General Terrain Monitoring** consists of monitoring the actual position of an aircraft and the predicted position of that aircraft for a look ahead time of 40 seconds, and providing an alert to ATC if the aircraft infringes or is predicted to infringe obstacle clearance polygons.

3.12.14 **Approach Path Monitoring** consists of monitoring the actual position of an aircraft and the predicted position of that aircraft for a look ahead time of 15 seconds, for an aircraft on the inbound (final approach) leg of an instrument approach, and providing an alert to ATC if the aircraft infringes or is predicted to infringe the appropriate obstacle clearance surface. Approach path monitoring ceases 2 NM from the runway threshold.

Note: the obstacle clearance surface is established below the segment OCA for that portion of the instrument approach in order to reduce nuisance alerts.

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3.12.15 In the event of an alert pilots will be advised **"TERRAIN ALERT"** and instructions or information passed as appropriate.

3.12.16 Subject to the conditions above, MSAW is available within the following airspaces:

(a) Whenuapai CTR/D;

(b) Auckland CTR/C, and all CTA airspaces within 45 NM of Auckland AD;

(c) Hamilton CTR/D and CTA/D;

(d) Tauranga CTR/D;

(e) Rotorua CTR/D and CTA/D;

(f) All CTA airspaces within 45 NM of PSN S 38° 00′ 30″ E 175° 48′ 40″ (midway Matamata and Tokoroa aerodromes);

(g) Ohakea CTR/D, and all CTA airspaces within 45 NM of Ohakea AD;

(h) Palmerston North CTR/D;

(i) Wellington CTR/C, and all CTA airspaces within 45 NM of Wellington AD;

(j) Christchurch CTR/C, and all CTA airspaces within 45 NM of Christchurch AD (MSAW not available for Christchurch Hospital (NZJC) procedures);

(k) Queenstown CTR/C and CTA/C.

3.12.17 Changes to this listing of locations will be advised by NOTAM or AIP Supplement.

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3.13 Radar Separation

3.13.1 Except where wake turbulence is a factor, when radar separation is being applied between controlled flights the minimum horizontal separation is 5 NM. This may be reduced in the following circumstances:

(a) when aircraft are operating within controlled airspace within 60 NM of either Auckland, Ohakea, Wellington, Christchurch or Queenstown aerodromes, the standard may be reduced to MNM 3 NM; or

(b) when aircraft are operating within controlled airspace within 60 NM of Te Weraiti surveillance site, the standard may be reduced to MNM 3 NM; or

(c) when aircraft on reciprocal tracks have passed and their radar position symbols have separated, radar separation exists.

3.13.2 Radar separations applicable when wake turbulence is a factor are shown in AD 1.7.

3.14 Position Information

3.14.1 Radar controllers will pass position information in one of the following forms:

(a) as a well known geographic position;

(b) magnetic track and distance to a significant point or navigation aid;

(c) bearing (using points of the compass) and distance from a known position;

(d) position relative to the centreline of an ATS route, or the final approach track of an instrument approach; or

(e) distance from touchdown, particularly for aircraft on final approach.

3.14.2 Aircraft under radar control will be informed of their position in the following circumstances:

(a) on first identification, except where the identification is based on a pilot's report of the aircraft's position, on departure, or by use of a discrete SSR code and the position is consistent with the known track of the aircraft;

(b) when the aircraft requests this information;

(c) when the aircraft's estimate differs significantly from the radar controller's estimate based on radar observation;

(d) at intervals when on a radar heading, particularly when being vectored for an instrument approach;

(e) as necessary when the aircraft is resuming its own navigation after radar vectoring; and

(f) when the aircraft is off track to the extent that it is outside the navigation tolerance for the type of navigation aid being used.

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3.15 Radar Departure Procedures

3.15.1 Departure instructions may contain an altitude restriction to a point from which climb to MSA for the succeeding route sector is possible. The purpose of this restriction is to provide non-radar separation until identity is established and radar control can be exercised.

3.16 Radar Approach Procedures

3.16.1 The pilot will be advised of the type of approach for which the aircraft is being radar vectored and the radar controller will pass information applicable to the type and stage of the approach procedure.

3.16.2 The type of approach will be the most appropriate approach procedure for the runway in use, having regard to the prevailing MET conditions and traffic.

3.16.3 An arriving aircraft will be radar vectored for an instrument approach at night, and by day when the visibility at the aerodrome of destination is less than 16 km or the reported ceiling is less than 1000 ft above the applicable minimum radar vectoring altitude.

3.16.4 This does not prevent a pilot requesting and being cleared for a visual approach while being vectored for an instrument approach, when the requirements for a visual approach can be met.

Radar Vectoring for Instrument Approach

3.16.5 An aircraft will be vectored so that it will be established on final approach at a level and distance that will enable the pilot to comply with the final approach procedure.

3.16.6 When the final approach procedure includes a specified glide path or vertical path angle, vectoring will enable the aircraft to be firmly established in level flight on final approach prior to intercepting the nominal glide path.

3.16.7 If an aircraft has to be vectored through the centreline of a pilot interpreted approach, the pilot will be advised of the controller's intentions and the reason for the track extension (e.g. sequencing). If no advice is given to a pilot prior to intercepting final approach, the pilot is to intercept final approach and advise ATC. This covers possible loss of communications and is particularly important where there is rising terrain on the opposite side of the approach track.

3.16.8 When being vectored for the final of an RNP approach or for an RNP (AR) approach, the pilot is to advise ATC if the intercept point will cause incorrect sequencing of the waypoints of the approach procedure. The pilot should request vectors back to an appropriate start point of the procedure.

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Radar Vectoring for Visual Approach

3.16.9 An arriving aircraft may be radar vectored for a visual approach:

(a) by day only when the visibility at the aerodrome is at least 16 km and the reported ceiling is at least 1000 ft above the applicable minimum radar vectoring altitude; and

(b) by night only at Christchurch for runways 11 or 29 provided the visibility at the aerodrome is at least 16 km and there is no cloud below 5000 ft.

3.17 Radar FIS

3.17.1 When radar FIS is provided it may include:

(a) collision hazard information; and

(b) information to assist the pilot with navigation.

3.17.2 Radar controllers are not permitted to offer or provide radar terrain information in uncontrolled airspace except in an emergency.

Collision Hazard Information

3.17.3 When an unknown aircraft is observed by radar to be on a conflicting path with a radar identified aircraft, the radar controller will, whenever practicable:

(a) warn the pilot of the identified aircraft and, if requested by the pilot or considered necessary by the controller, suggest a course of avoiding action; and

(b) advise the pilot when the confliction no longer exists.

3.17.4 An aircraft target observed on radar is considered to represent an unknown aircraft when the radar controller is unable to relate it to any controlled flight known to be operating within the airspace concerned.

3.17.5 An unknown aircraft is considered to be on a conflicting path when, in the opinion of the radar controller, the projected aircraft tracks would reduce separation to less than 3 NM.

3.17.6 Information passed to the identified aircraft to assist the pilot to sight the other aircraft will include:

(a) its relative bearing in terms of the 12-hour clock;

(b) its distance and apparent movement; and

(c) if available, its unverified Mode C altitude readout.

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3.17.7 The provision of this information is not intended to relieve the pilot of the responsibility to see and avoid other aircraft. It is provided to aid the pilot in visual surveillance by calling attention to a specific direction in which radar indicates possible conflicting traffic exists.

3.17.8 Notwithstanding the above, radar controllers are not required to pass information to identified aircraft concerning unknown aircraft observed on radar when:

(a) it can reasonably be assumed that the unknown aircraft is operating within, and complying with the procedures appropriate to designated special use airspace, VFR transit lanes, or general aviation areas; or

(b) the identified aircraft is operating in controlled airspace if it can reasonably be assumed that the unknown aircraft is operating below the airspace concerned.

3.18 Significant Weather Information

3.18.1 ATC radars do not display weather clutter and the radar controller is not aware of the presence of areas of adverse weather.

3.19 Emergency Action

3.19.1 In the event of an aircraft being, or appearing to be, in any form of emergency, the radar controller will afford every assistance.

3.19.2 Identification will be established as early as possible by the most suitable method consistent with ensuring the safety of the aircraft, and a suitable course of action will be agreed between the radar controller and the pilot. Where two-way RTF communication is impaired, the progress of the affected aircraft will be plotted on the radar display and identified aircraft kept clear. Position information will be passed to all ATS units that may be able to render assistance to the aircraft.

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3.20 Radar and Radio Failure Procedures

3.20.1 In the event of radar failure or loss of radar identification, the radar controller will issue instructions to restore non-radar separation between those aircraft operating with radar separation. As an emergency measure, use of levels spaced by half the applicable separation minimum may be resorted to until standard separation can be restored.

3.20.2 If two-way communication is lost with an identified aircraft, the radar controller will first determine whether or not the aircraft's receiver is functioning by instructing the aircraft on the frequency in use (and via data link if so equipped) to acknowledge by:

(a) squawking ident

(b) changing transponder code

(c) keying the transmitter or

(d) making a specific turn

3.20.3 If the aircraft is observed to make any of the above actions the pilot will be advised that radar control is being continued.

3.20.4 If the above action is unsuccessful, the instructions will be repeated on any available frequencies on which it is believed the aircraft might be listening.

3.20.5 Aircraft on initial/intermediate approach being vectored for the final of a pilot interpreted approach should continue with the approach whilst maintaining the last assigned level until established on the final approach track, and then commence approach.

3.20.6 If two-way communication is lost with an aircraft that has not been identified, the aircraft will, if possible, be identified by requesting the pilot to:

(a) squawk ident

(b) change transponder code

(c) key the transmitter or

(d) make a turn followed by instructions to regain track

3.20.7 If the aircraft is observed to make any of the above actions the pilot will be advised that the flight has been identified and the pilot will be requested to make a further action to indicate whether or not radar assistance is required. If the pilot confirms by making the agreed action that radar assistance is required, radar control will be continued.

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3.20.8 If the aircraft is not observed to make any of the above actions, the instruction will be repeated on any available frequencies on which it is believed the aircraft might be listening, or via data link if equipped.

3.20.9 When it is determined that an aircraft has experienced a complete communications failure, the radar controller will provide radar separation between that aircraft and any other aircraft under radar control unless it is known that non-radar separation exists.

3.20.10 If the aircraft experiencing the communications failure is not identified, radar separation will be applied by the radar controller between aircraft under radar control and any unidentified aircraft observed along the expected route of the aircraft with the communications failure until such time as it is known, or can safely be assumed, that the aircraft with radio failure has passed through the airspace concerned or has landed.

4 PRIMARY SURVEILLANCE RADAR (PSR)

4.1 PSR Sites

4.1.1 PSRs are located at:

(a) Auckland Airport, maximum range of up to 80 NM;

(b) Christchurch Airport, maximum range of up to 120 NM; and

(c) Hawkins Hill (3.5 NM west of Wellington Airport) — temporarily decommissioned for replacement works.

5 SECONDARY SURVEILLANCE RADAR (SSR)

5.1 SSR Sites

5.1.1 SSRs, with a maximum range of 256 NM, are located at the following sites:

(a) Ruaotuwhenua 12.5 NM north-west of Auckland Airport;

(b) Te Weraiti Kaimai Range 6.5 NM east of Matamata Township;

(c) Ballance Tararua Range between Palmerston North aerodrome and Pahiatua Township;

(d) Hawkins Hill 3.5 NM west of Wellington Airport; temporarily decommissioned for replacement works;

(e) Mt Robertson 3 NM south-east of Picton Township;

(f) Cass Peak Port Hills 9.5 NM south-east of Christchurch Airport;

(g) Christchurch airport.

5.1.2 The SSR sites are all elevated to improve low level cover. They are shown on the appropriate topographical charts.

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6 AUTOMATIC DEPENDENT SURVEILLANCE — BROADCAST (ADS-B)

6.1 ADS-B Sites

6.1.1 ADS-B sites are located at:

(a) Christchurch TWR

(b) Cass Peak

(c) Cardrona

(d) Mt Nicholas

(e) Obelisk

(f) Coronet Peak

(g) Ruaotuwhenua

(h) Te Weraiti

(i) Ballance

(j) Hawkins Hill

(k) Mt Robertson

(l) Maungataniwha

(m) Waiatarua

(n) Auckland TWR

(o) Tauranga TWR

(p) Hamilton TWR

(q) Rotorua TWR

(r) Whakapunaki

(s) New Plymouth TWR

(t) Ohakea TWR

(u) Nelson TWR

(v) Wellington TWR

(w) Mt Rochfort

(x) Paparoa

(y) Dunedin TWR

(z) Invercargill TWR

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6.1.2 ADS-B sites are all elevated to improve low level cover; however, at low levels in mountainous terrain, coverage may be reduced.

6.1.3 Below is a table that lists the regions that have been reported with reduced coverage.

Location	Service	Region
Queenstown	ADS-B	West of Ben Lomond Mountain range, around Moke Lake

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7 AREA OF SURVEILLANCE COVERAGE

7.1 Surveillance Coverage

7.1.1 The area of theoretical PSR coverage is provided in Figure ENR 1.6-1.

7.1.2 The area of theoretical SSR coverage is provided in Figure ENR 1.6-2.

7.1.3 The area of theoretical MLAT coverage is provided in Figure ENR 1.6-3.

7.1.4 The area of theoretical ADS-B Coverage — North is provided in Figure ENR 1.6-4.

7.1.5 The area of theoretical ADS-B Coverage — South is provided in Figure ENR 1.6-5.

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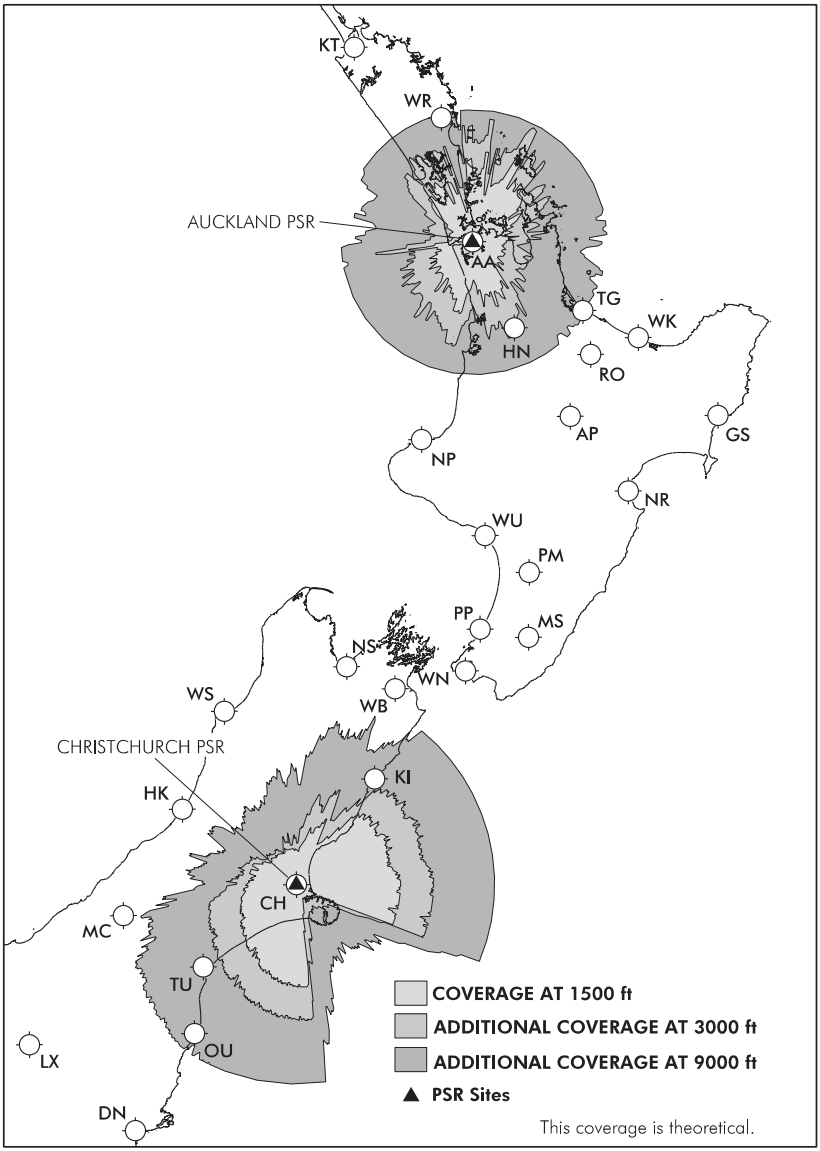
Figure ENR 1.6-1
Area of Theoretical PSR Coverage



Changes from 31 DEC 22: CH PSR coverage updated, Hawkins Hill coverage removed.

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Figure ENR 1.6-2
Area of Theoretical SSR Coverage

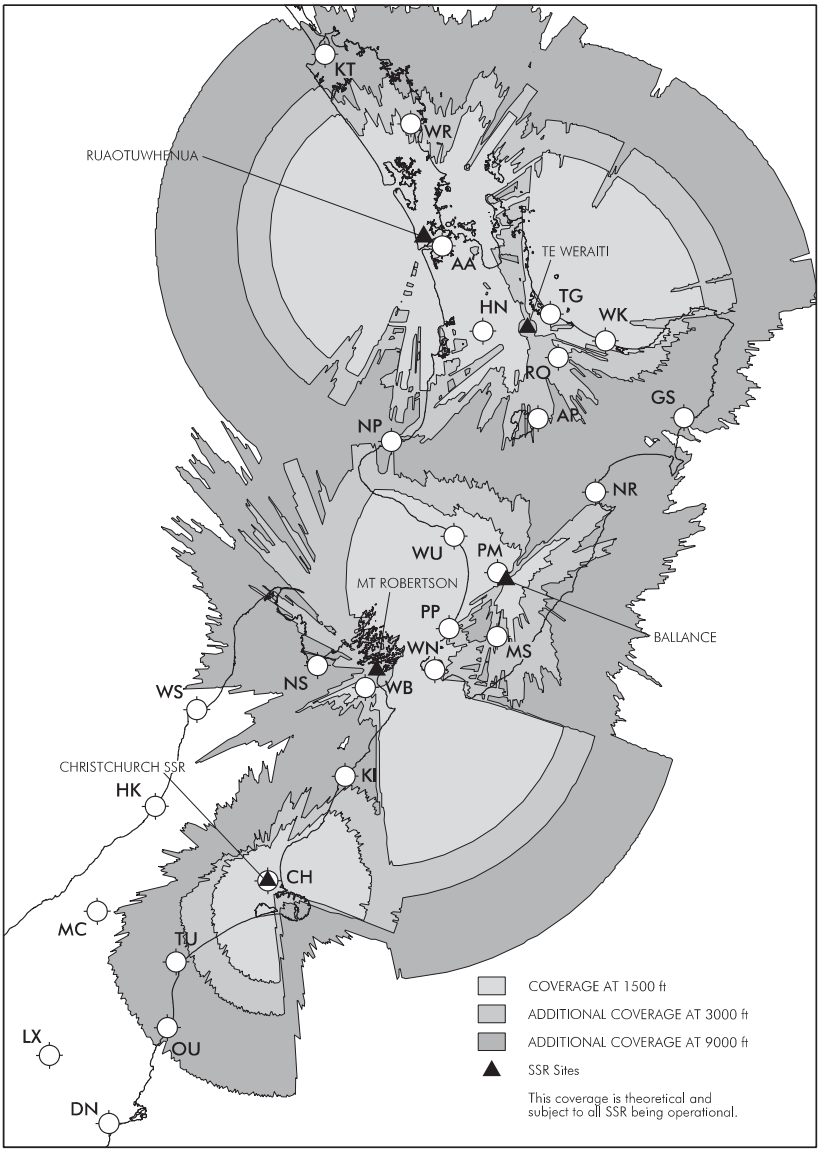

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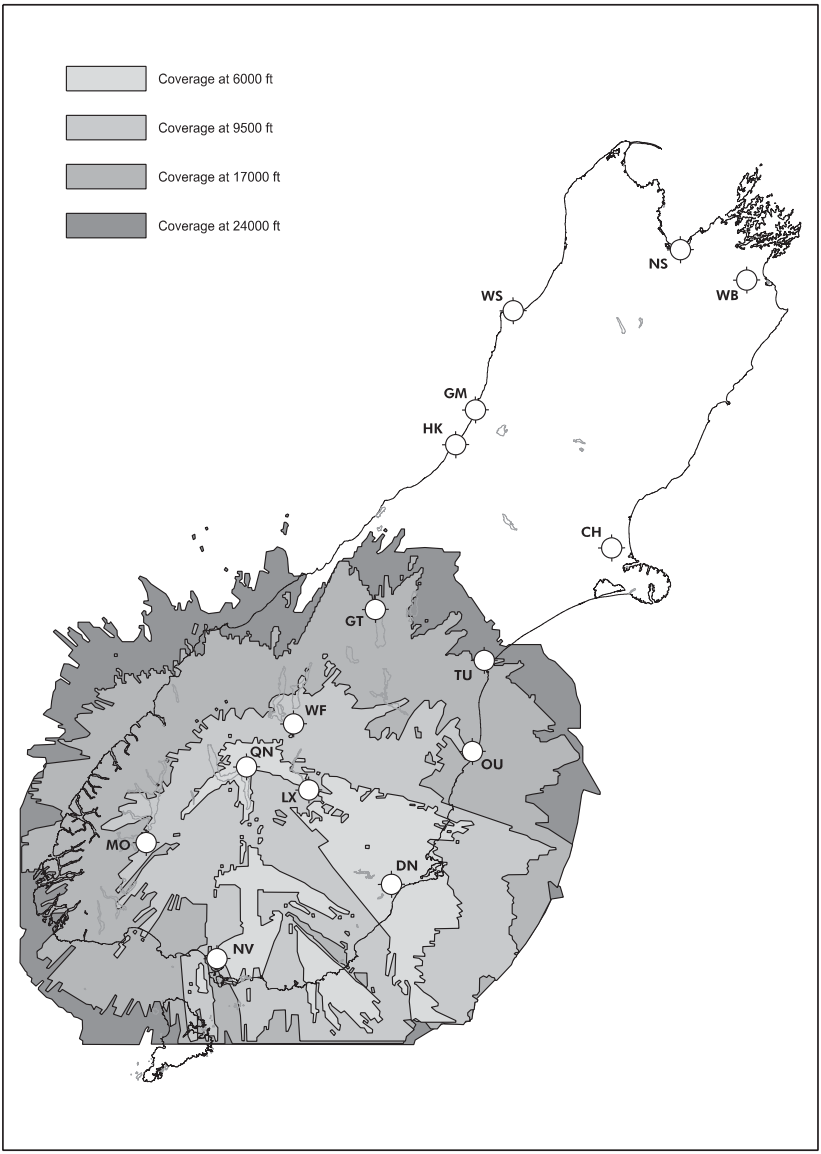
Figure ENR 1.6-3
Area of Theoretical MLAT Coverage



AIP-MLAT-B

Changes from 6 FEB 14: Graphic standard editorial.

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Figure ENR 1.6-4
Area of Theoretical ADS-B Coverage — North

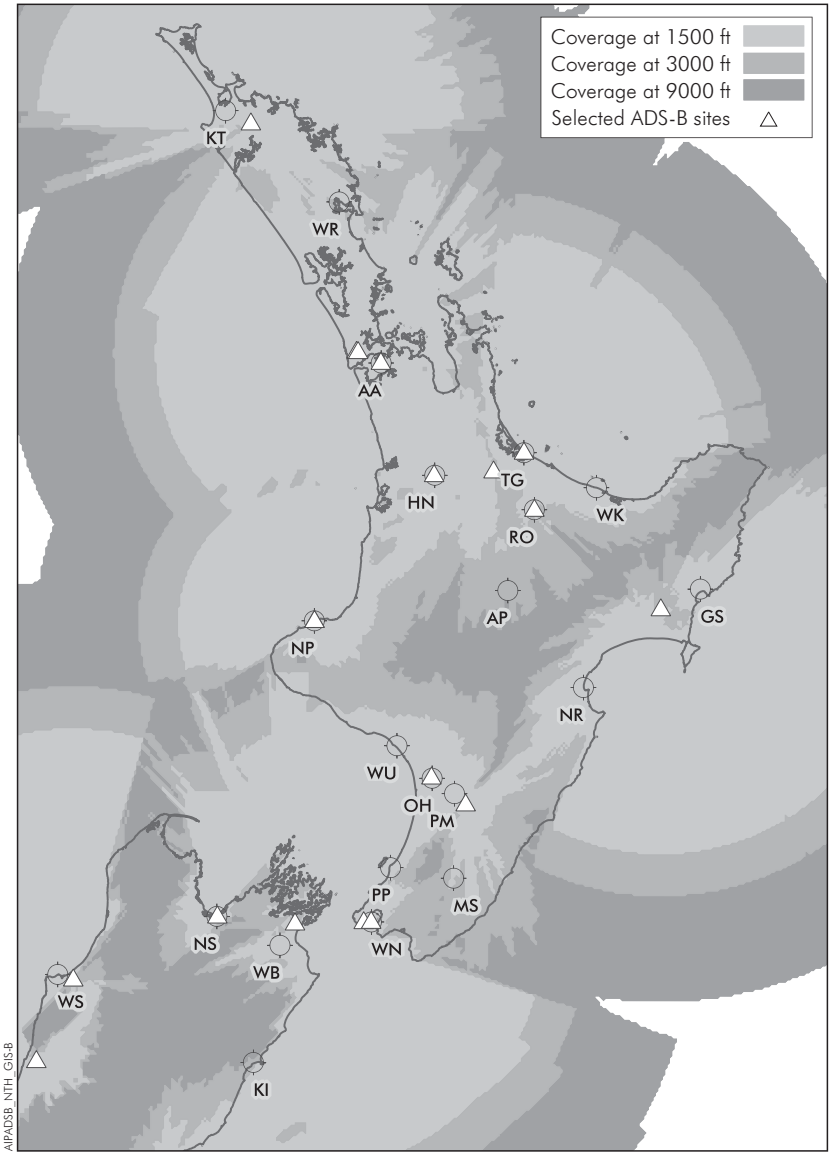

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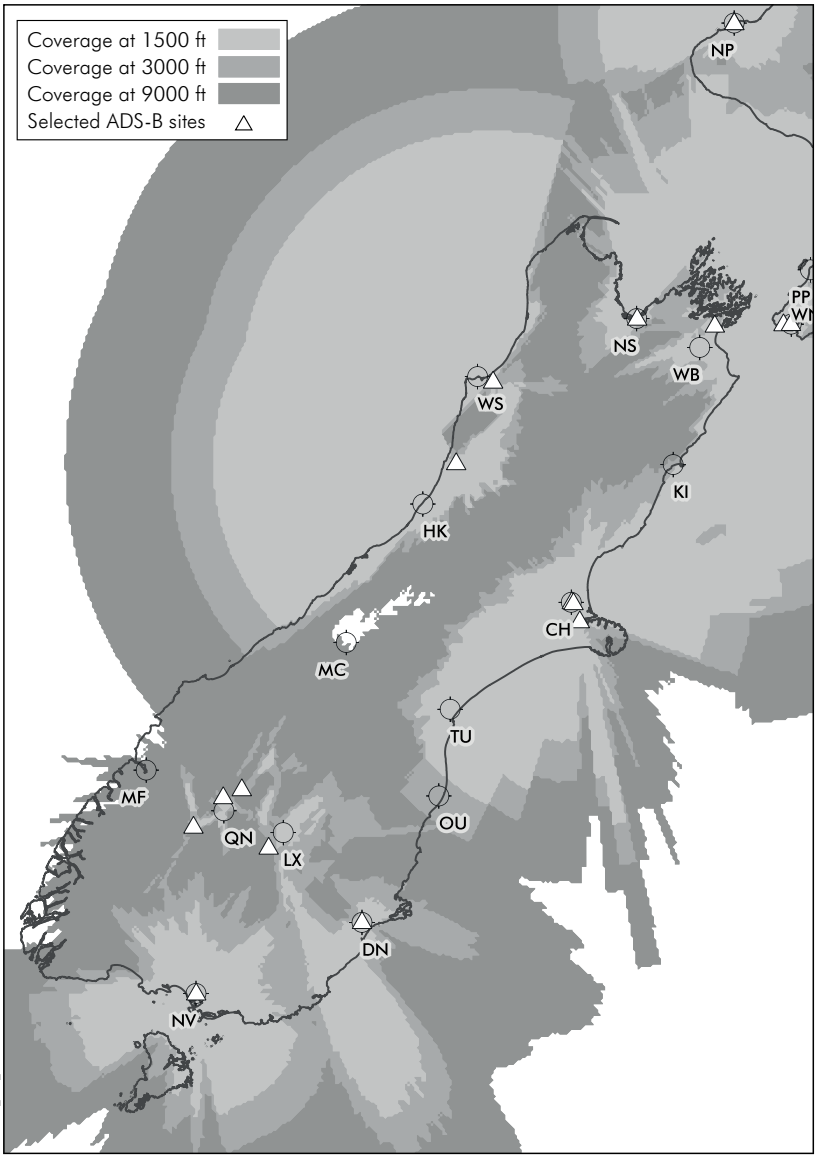
Figure ENR 1.6-5
Area of Theoretical ADS-B Coverage — South



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