

# **Frequency coordination and licensing procedures for apparatus licensed point-to-multipoint services in the 5.6 GHz band**

**Radiocommunications Assignment and Licensing Instruction**

**RALI: FX 23**

**DATE OF EFFECT: 18/12/2023**

**DISCLAIMER**

The Australian Communications and Media Authority (ACMA) advises that these instructions reflect the current policies of the ACMA.

Prospective applicants for licences should take all necessary steps to ensure that they have access to appropriate technical and other specialist advice independently of ACMA concerning their applications, the operation of radiocommunications equipment and services, and any other matters relevant to the operation of transmitters and services under the licences in question.

The policies of ACMA and the laws of the Commonwealth may change from time to time, and prospective licensees should ensure that they have informed themselves of the current policies of ACMA and of any relevant legislation (including subordinate instruments). Prospective applicants for licences should not rely on statements made in these instructions about the policies that may be followed by other government authorities or entities, nor about the effect of legislation. These instructions are not a substitute for independent advice (legal or otherwise) tailored to the circumstances of individual applicants.

Radiocommunications Assignment and Licensing Instructions are subject to periodic review and are amended as ACMA considers necessary. To keep abreast of developments, it is important that users ensure that they are in possession of the latest edition.

No liability is or will be accepted by the Minister or the Department of Infrastructure, Transport, Regional Development, Communications and the Arts, ACMA, the Commonwealth of Australia, or its officers, servants or agents for any loss suffered, whether arising directly or indirectly, due to reliance on the accuracy or contents of these instructions.

Suggestions for improvements to Radiocommunications Assignment and Licensing Instructions may be addressed to The Manager, Spectrum Engineering, ACMA at PO Box 78, Belconnen, ACT, 2616, or by e-mail to [freqplan@acma.gov.au](mailto:freqplan@acma.gov.au). It would be appreciated if notification to ACMA of any inaccuracy or ambiguity found be made without delay in order that the matter may be investigated, and appropriate action taken.

## Amendment History

Date of Effect	Comments
18/12/2023	Update of potential new radar sites in Annex D and removal of interim arrangements for the migration of 3.6 GHz band point-to-multipoint services to the 5.6 GHz band (previously in section 3.2bis)
17/12/2018	Initial release

# Contents

<b>DISCLAIMER .....</b>	<b>I</b>
<b>1. INTRODUCTION .....</b>	<b>1</b>
1.1 PURPOSE .....	1
1.2 BACKGROUND .....	1
1.3 SCOPE .....	1
<b>2. ASSIGNMENT INSTRUCTIONS .....</b>	<b>2</b>
2.1 CHANNEL ARRANGEMENTS .....	2
2.2 ASSIGNMENT RULES .....	2
<b>3. FREQUENCY COORDINATION .....</b>	<b>4</b>
3.1 INTERFERENCE SCENARIOS .....	4
3.2 POINT-TO-MULTIPOINT LICENCES .....	4
3.3 PMP REMOTE STATION COORDINATION .....	6
3.4 PROTECTION OF RADIOLOCATION LICENCES .....	6
3.5 PROTECTION OF PMP RECEIVERS FROM RADIOLOCATION LICENCES .....	9
3.6 SITE ENGINEERING ASPECTS .....	10
<b>4. LICENSING .....</b>	<b>11</b>
4.1 OVERVIEW OF LICENSING .....	11
4.2 CONDITIONS INCLUDED IN THE FIXED LCD .....	11
4.3 SPECIAL CONDITIONS .....	11
4.4 ADVISORY NOTES .....	12
4.5 ADDITIONAL INFORMATION ON TECHNICAL RECORDS .....	12
<b>5. RALI AUTHORISATION .....</b>	<b>13</b>
<b>6. REFERENCES .....</b>	<b>14</b>
<b>ANNEX A: OUT-OF-BAND AND SPURIOUS EMISSION LEVELS .....</b>	<b>15</b>
A1. Licensed PMP Base Stations .....	15
A2. PMP Remote stations .....	16
A3. Radiolocation stations .....	16
<b>ANNEX B: AREA IN WHICH LICENSING IS PERMITTED .....</b>	<b>17</b>
<b>ANNEX C: NOTIFICATION REQUIREMENTS .....</b>	<b>19</b>
<b>ANNEX D: PARAMETER VALUES FOR RADAR SITE CO-ORDINATION .....</b>	<b>20</b>

# 1. Introduction

## 1.1 Purpose

The purpose of this Radiocommunications Assignment and Licensing Instruction (RALI) is to provide information about, and describe necessary steps for the frequency coordination and licensing of apparatus licensed fixed point-to-multipoint (PMP) services in the 5600-5620 MHz and 5630-5650 MHz bands.

The information in this document reflects the ACMA's statement of current policy in relation to frequency coordination and apparatus licensing of PMP services in the 5600-5620 MHz and 5630-5650 MHz frequency ranges. In making decisions, accredited frequency assigners and the ACMA's officers should take all relevant factors into account and decide each case on its merits. Issues relating to this document that appear to fall outside the enunciated policy should be referred to the Manager, Spectrum Engineering and Space Section, PO Box 78, Belconnen, ACT, 2616, or by e-mail to [freqplan@acma.gov.au](mailto:freqplan@acma.gov.au).

## 1.2 Background

The 5600-5650 MHz (5.6 GHz) band is currently used by radiolocation services. With a few exceptions, the radiolocation services are Bureau of Meteorology (BoM) C-band weather watch radars. Most of the BoM radars are licensed to operate on a centre frequency of 5625 MHz (but it should be noted that a few radars are licensed on frequencies near the lower and upper ends of the 5600-5650 MHz band). Studies have indicated that sharing between Point-to-Multipoint (PMP) systems and radars in the 5.6 GHz band may be possible if there is a sufficient combination of distance and frequency separation from the radar receivers.

## 1.3 Scope

The primary purpose of this RALI is to detail the steps necessary for frequency coordination and licensing of proposed PMP systems in the 5600-5620 MHz and 5630-5650 MHz frequency ranges. To provide scope for future expansion of the BoM weather radar network within this band, the central part of the 5.6 GHz band (5620-5630 MHz) has been set aside for radar only use and will not be available for PMP licensing.

The RALI provides instructions that may be used by ACMA assigners and Accredited Persons when assessing whether proposed new PMP systems will cause (or receive) unacceptable interference to (or from) existing services in the band.

It is a requirement that coordination calculations must be performed to assess potential interference to BoM radar services as well as to and from PMP systems. In some cases the effect of remote stations of the PMP system will need to be considered in addition to the base station which is always required. Interference protection and requirements to protect other services are based upon the conditions contained in section 3.4 of this RALI.

In the event that interference occurs after a licence is issued and the issue cannot be resolved between the affected parties, licensees can expect the ACMA to have regard to this RALI and relevant [legislative instruments](#) in dealing with the dispute.

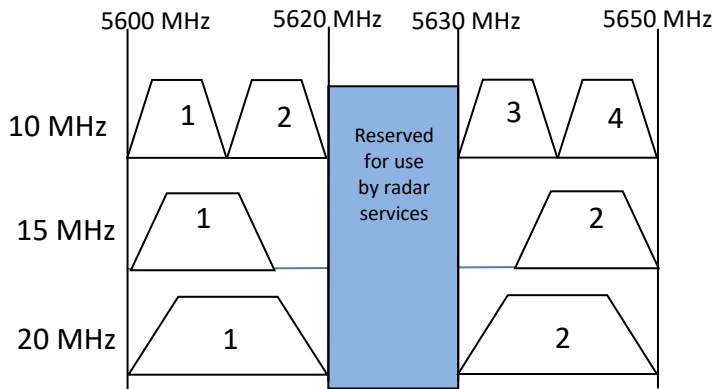
It is noted that this RALI could also be used for the coordination of new radiolocation services in the 5.6 GHz band.

## 2. Assignment Instructions

### 2.1 Channel arrangements

In the 5600-5620 MHz and 5630-5650 MHz frequency ranges 10, 15 and 20 MHz channels are defined as described in Figure 1 and Table 1.

**Figure 1: PMP channel plan for the 5600-5620 MHz and 5630-5650 MHz frequency ranges**



**Table 1: PMP channel plan centre frequencies**

Channel	Channel centre frequencies		
	10 MHz	15 MHz	20 MHz
1	5605	5607.5	5610
2	5615	5642.5	5640
3	5635		
4	5645		

### 2.2 Assignment Rules

#### Emission Limits

Transmitters operated under a PMP licence are subject to:

- an in-band emission limit of 42.5 dBm EIRP/MHz radiated in the horizontal direction<sup>1</sup>; and,
- the out-of-band and spurious emission limits defined in **Annex A**.

#### Channel Plan

For PMP services the 10, 15 and 20 MHz channelling arrangements in section 2.1 apply.

#### Assignment Priority

When assigning 10 MHz PMP channels, co-ordination on channels 1 and 4 should be attempted before attempting coordination on channels 2 or 3.

These rules are aimed at maximising protection of radar receivers operating in the centre of the band while maximising spectrum availability for other prospective licensees (including new radar services). Alternative ways of assigning spectrum can be considered on a case-by-case bases by the ACMA where it is deemed to improve the efficiency in use and allocation of spectrum.

<sup>1</sup> Note: Systems with antenna down-tilt can operate with maximum EIRP density values greater than 42.5 dBm/MHz. Licensees must confirm that they comply with the 42.5 dB/MHz in the horizontal direction limit and must record maximum EIRP, antenna pattern and down-tilt data in the licensing database.

Exemption requests should be sent to [freqplan@acma.gov.au](mailto:freqplan@acma.gov.au).

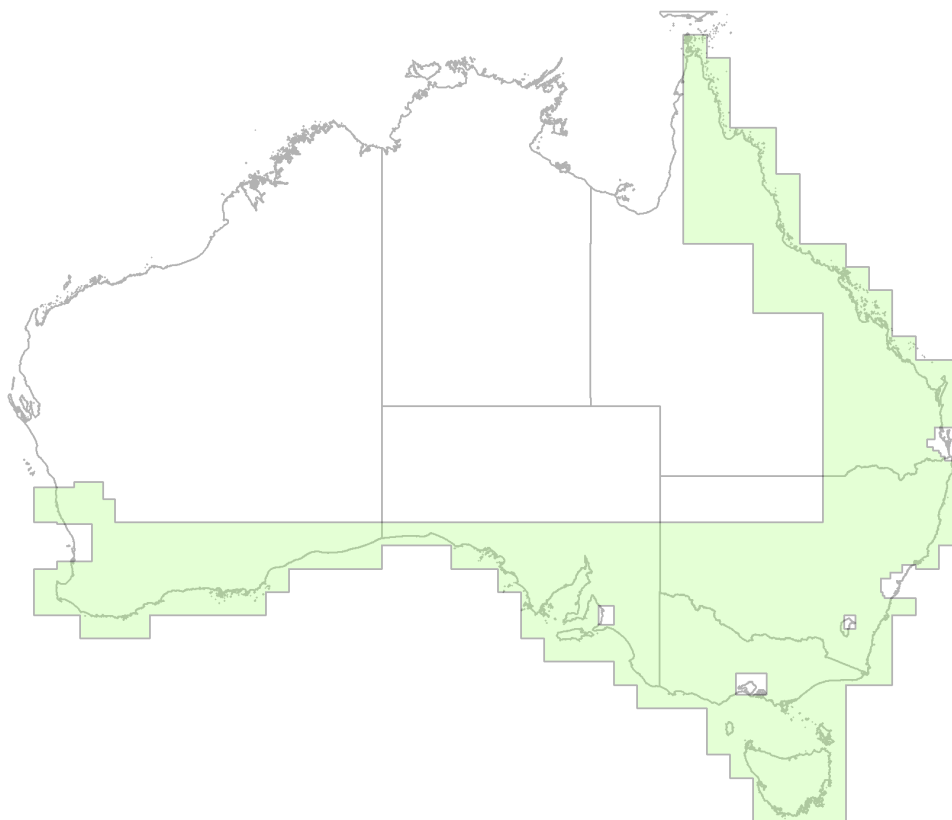
### Site Sense

No site sense rules are needed as arrangements for PMP services in the 5600-5620 MHz and 5630-5650 MHz frequency ranges are intended for single frequency deployments using time division duplex (TDD) (i.e. systems transmit and receive on the same frequency).

### Licence Area Definition

PMP licences can only be issued in the 5600-5620 MHz and 5630-5650 MHz frequency ranges in the geographical area defined by a sequence of HCIS identifiers<sup>2</sup> given in **Annex B**. Figure 2 provides a pictorial representation of the geographical areas in which licences may be issued.

**Figure 2: Map showing areas in which 5.6 GHz band PMP licences may be issued**



<sup>2</sup> The HCIS is described in the *Australian Spectrum Map Grid 2012*. The *Australian Spectrum Map Grid 2012* is available on the ACMA website at: [www.acma.gov.au](http://www.acma.gov.au). Copies are also available from the ACMA.

## 3. Frequency Coordination

### 3.1 Interference Scenarios

The [Australian Radiofrequency Spectrum Plan \(ARSP\)](#) allocates the 5600-5650 MHz band to Maritime Radionavigation, Mobile except aeronautical mobile and Radiolocation services on a primary basis. There is no Fixed service allocation in this band. However, under subsection 10(10) of the ARSP, the ACMA has authorised use of an “unspecified service” (in this case the Fixed service) in the frequency ranges 5600-5620 and 5630-5650 MHz.<sup>3</sup> This will also be formally reflected in the next revision to the ARSP.

The following sections define the relevant coordination procedures to be followed by prospective PMP licensees seeking to access channels in the 5.6 GHz band. Table 2 summarises the different interference scenarios that exist for PMP services in the 5600-5620 and 5630-5650 MHz bands. Specific coordination procedures have only been defined for those scenarios that require it.

Please note that the licence data for some radars is in the process of being updated. Until this process is finalised the following rules should be adhered to for coordination purposes:

- > All licenced radar sites should be assumed to have both a Transmitter and Receiver operating at them.
- > The same antenna details should be assumed to apply to both the Transmitter and Receiver;
- > Any radar licences with an antenna height of 0m should be replaced with a height of 20m;
- > Any radar licences with an antenna gain of 0 dBi should be replaced with a gain of 45 dBi.

**Table 2: Summary of potential interference scenarios**

Interference scenarios	Coordination procedure
PMP Tx (base stations) → PMP Rx	Section 3.2
PMP remote stations → other devices	Section 3.3
PMP Tx (base and remote stations)→ Radiolocation Rx	Section 3.4
Radiolocation Tx → PMP Rx (base stations)	Section 3.5

### 3.2 Point-to-multipoint Licences

Point-to-multipoint (PMP) licences may be authorised to operate in the 5600-5620 MHz and 5630-5650 MHz frequency ranges.

It is noted that:

- > All devices operating under a PMP licence must comply with:
  - > the in-band maximum radiated power limit defined in section 2.2; and
  - > the out-of-band and spurious emission limits defined in **Annex A**;
- > Because PMP licensees in this band will employ TDD transmission systems that transmit and receive on the same frequency, there will be a high interference risk between adjacent or near-adjacent channels. To mitigate this risk, in addition to the coordination requirements noted in section 3.3, an adjacent channel notification condition will apply if a prospective new operator wishes to establish a base station on an adjacent channel anywhere in the 5.6 GHz band within 30 km of an existing base station.

<sup>3</sup> Notices pursuant to clause 10(10) of the ARSP are available on the [ACMA website](#).



***PMP Tx → PMP Rx***

When coordinating with PMP receivers, the following procedure applies:

1. Confirm that the proposed base station location is within the area defined in **Annex B**;
2. Confirm that the maximum EIRP density limit in section 2.2 is not exceeded;
3. Area Cull: Identify any licensed 5.6 GHz band PMP receivers within 200 km of the proposed base station location;
4. For a PMP receiver identified in step 3, in order to manage interference, two separate scenarios need to be assessed.
  - a. Base stations: Unwanted emissions from a PMP transmitter into PMP receivers must not exceed the values in Table 3<sup>4</sup>.

**Table 3: Protection criteria (not to be exceeded for 20% of time) for PMP Base Station receivers.**

<b>PMP Base Station Receiver Protection Criteria (at the input of the receiver)</b>		
<b>Full overlap cases (transmitter bandwidth ≥ receiver bandwidth)</b>		
	Bandwidth of overlap	Power (dBm) within the overlap
(10 MHz → 10 MHz) (15 MHz → 10 MHz) (20 MHz → 10 MHz)	10 MHz	-100
(15 MHz → 15 MHz) (20 MHz → 15 MHz)	15 MHz	-98
(20 MHz → 20 MHz)	20 MHz	-97
<b>Partial overlap cases (transmitter bandwidth &lt; receiver bandwidth)</b>		
	Bandwidth of overlap	Power (dBm) within the overlap
(10 MHz → 20 MHz) (10 MHz → 15 MHz)	10 MHz	-100
(10 MHz → 15 MHz)	5 MHz	-103
(15 MHz → 20 MHz)	15 MHz	-98
Adjacent channel cases		
See Note below		

Note: The table does not include protection criteria for non-overlap cases. Management of potential interference in such cases is controlled by the time division duplex adjacent channel interference condition in the Fixed LCD (see section 4.2 of this RALI). In particular, where different operators propose to use adjacent 10 MHz channels 1 and 2 (or 10 MHz channels 3 and 4) there is a need for very careful interference management between licensees.

- b. Remote stations: Where the co-channel separation distance exceeds 30 km it is expected that adequate interference protection to and from remote stations will be achieved in most, if not all, cases. However, in the event interference does

<sup>4</sup> The values in Table 3 are calculated based on protection of an I/N level of 0 dB for a system with an assumed receiver noise figure/cable loss figure of 5 dB and a 1 dB allowance for multiple interferers. The protection criteria in Table 3 applicable for scenarios of a 10 MHz transmitter coordinating with a 15 or 20 MHz receiver includes an additional 3 dB margin to cover the potential for two 10 MHz channel interferers overlapping the receiver bandwidth. In calculating compliance with these limits, the propagation model defined in ITU-R Recommendation P.452, with the parameter  $p=20\%$  should be used.

The parameter  $p$  is the required time percentage for which the calculated basic transmission loss is not exceeded.

occur, section 3.3 of this RALI applies. **OFFICIAL**

5. Where the separation distance between a proposed PMP base station and another adjacent channel PMP base station operated by a different licensee is within 30 km, before being issued a licence, prospective licensees (or their accredited persons) are required to notify any PMP licensees that have licences located within 30 km and have a channel edge to channel edge frequency separation of less than 10 MHz with the proposed new service. (See **Annex C** for the outline of a pro forma notification letter.)

This allows time for potentially affected parties to negotiate with prospective licensees and implement any additional mitigation that may be required.

### 3.3 PMP Remote station coordination

Remote stations<sup>5</sup> are authorised to operate under the authorisation provided through the [Radiocommunications Licence Conditions \(Fixed Licence\) Determination 2015](#) (the Fixed LCD). The Fixed LCD only authorises the use of remote stations when communicating with a station operating under a valid PMP licence.

The Fixed LCD also requires that remote stations must not cause interference to another radiocommunications service and will not be afforded protection from interference from another radiocommunications service.

### 3.4 Protection of Radiolocation Licences

It is expected that any future radiolocation service licensing in the 5.6 GHz band will normally be centred on 5625 MHz. However, a small number of radiolocation licences have been issued at other frequencies in the 5600-5650 MHz frequency range. Prospective PMP licensees must coordinate with any identified radiolocation receivers in the entire 5600-5650 MHz range.

#### PMP base station transmitter → Radiolocation receiver coordination

When coordinating with a radiolocation receiver, the following procedure applies:

1. Area Cull: Identify any 5.6 GHz band radiolocation receiver sites listed in the RRL or in **Annex D** of this RALI that are within 550 km of the proposed PMP base station location;
2. Coordination is required with any radiolocation receiver site identified in step 1. In order to manage interference, two separate scenarios need to be assessed:
  - a. Base stations: Unwanted emissions from a PMP base station transmitter into a radiolocation receiver<sup>6</sup> must not exceed the values in the table below<sup>7</sup>

<sup>5</sup> Various terms exist to describe the “remote stations” in a point-to-multipoint system. Examples include “subscriber terminals”, “outstations”, “subscriber modems”, “consumer premise equipment”, ‘subscriber station’. For the sake of consistency with regulatory terminology the term “remote stations” is used in this RALI.

<sup>6</sup> For coordination purposes all radar receivers are assumed to have a spectral mask as defined in Annex A, Table A.3a.

<sup>7</sup> The values in the Table are calculated based on protection of an I/N level of -10 dB for a system with an assumed combined LNA noise figure /waveguide loss figure of 3 dB. A further 3 dB allowance was added to allow for, potentially, two equal level upper and lower adjacent interferers and a further 1 dB contribution from other potential interferers. In calculating compliance with these limits the propagation model defined in ITU-R Recommendation P.452, with the parameter  $p=1\%$  should be used.

The parameter  $p$  is the required time percentage for which the calculated basic transmission loss is not exceeded.

**Table 4: Protection criteria for Radiolocation receivers<sup>8</sup>**

Frequency offset (between centre frequencies) (MHz)	Radiolocation Receiver Protection Criteria (at the input of the radiolocation receiver)		
	10 MHz PMP transmitter (dBm in 1 MHz)	15 MHz PMP transmitter (dBm in 1 MHz)	20 MHz PMP transmitter (dBm in 1 MHz)
Co-channel	-125	-125	-125
5 MHz	-118	-125	-125
7.5 MHz	-90	-114	-125
10 MHz	-85	-91	-111
15 MHz	-75	-85	-90
17.5 MHz	-75	-82	-87
20 MHz	-75	-78	-85
25 MHz	-75	-75	-79
30 MHz or more	-75	-75	-75

In performing this calculation, the following assumptions should be made:

- > Radar receive antenna beam-width: obtained from the RRL or **Annex D** of this RALI;
- > Radar receive antenna pattern: a vertical antenna pattern described by the Recommendation ITU-R M.1851, § 2 cos function pattern (for the single-entry interferer case) with an assumed up-tilt of 0.5° in the elevation plane. This vertical pattern is rotated through 360° in the azimuth plane;
- > Height of radar receive antenna: obtained from the RRL or **Annex D** of this RALI;
- > Lat/long coordinates of radar receiver: obtained from the RRL or **Annex D** of this RALI;
- > Height of PMP base station transmit antenna: as per application;
- > PMP base station EIRP (in PMP bandwidth): as per application<sup>9</sup>;
- > Terrain database: 3 sec (or higher resolution) DEM;
- > Propagation model: Recommendation ITU-R P.452 for 1% time<sup>10</sup>.

- b. **Remote stations:** In general, coordination of PMP base stations (which typically have higher antenna heights above local terrain and higher EIRP levels) will create a “coordination envelope” within which most, if not all, PMP remote stations would fall. Nevertheless in a small number of situations a base station transmitter may meet the necessary radar receiver coordination requirements but (because an intervening terrain obstruction blocks interference from a base-station transmitter) a remote station associated with the base station may not be able to satisfy the coordination requirements. To address this potential interference risk, the prospective PMP licensee (or their accredited assigner) should perform a check to ensure that the predicted coverage area of the PMP service does not overlap with the interference contour of the radar receiver.

<sup>8</sup> These values are based on:

- an assumed radar receiver mask with a -3 dB bandwidth of approximately 1 MHz and slopes derived from information supplied by the Bureau of Meteorology; and,
- PMP services adhering to the out-of-band emission mask defined in **Annex A**.

<sup>9</sup> The eirp should not exceed the level described in section 2.2 of this RALI.

<sup>10</sup> For paths that include substantial over-water components the implementation of the ITU-R Rec. P.452 model should include adjustment to take account of the over-water path.

To perform this check:

(i) calculate the interference contour of the radar receiver<sup>6</sup> using the following assumptions:

- > Radar receive antenna beam-width: obtained from the RRL or **Annex D** of this RALI;
- > Radar receive antenna pattern: a vertical antenna pattern described by the Recommendation ITU-R M.1851, § 2 cos function pattern (for the single-entry interferer case) with an assumed up-tilt of 0.5° in the elevation plane. This vertical pattern is rotated through 360° in the azimuth plane;
- > Height of radar receive antenna: obtained from the RRL or **Annex D** of this RALI;
- > Lat/long coordinates of radar receiver: obtained from the RRL or **Annex D** of this RALI;
- > Height of PMP remote station transmit antenna: 10 m above ground level;
- > PMP remote station transmit power: 26 dBm.
- > PMP remote station maximum antenna gain: 18 dBi;
- > PMP remote station antenna radiation pattern envelope: Pattern TS 2, Range 1 in ETSI EN 302 085 V1.2.3;
- > PMP remote station antenna pointing direction: the PMP remote station antenna is assumed to point at the PMP base station location which is (or will be) recorded in the RRL;
- > **x** dBm radar receiver protection contour threshold;
- > Terrain database: 3 sec (or higher resolution) DEM;
- > Propagation model: Recommendation ITU-R P.452 for 1% time<sup>10</sup>.

Note: **x** dBm is the applicable protection level that takes into account the frequency offset and the bandwidth correction factor between the centre frequency of the radar receiver and the PMP base station transmitter. Values are provided in Table 4.

(ii) calculate a PMP coverage contour for remote stations associated with the PMP system around the proposed base station location using the following assumptions:

- > PMP remote transmitter EIRP: 44 dBm/20 MHz (26 dBm/20 MHz + 18 dBi);
- > PMP base station receive antenna gain, antenna tilt and height as proposed by applicant;
- > PMP remote transmitting antenna height: 10 m above ground level;
- > PMP base station receiver operation threshold: - 87 dBm per 20 MHz;
- > Terrain database: 3 sec (or higher resolution) DEM;
- > Propagation model: Recommendation ITU-R P.452 for 50% time.

Remote stations that satisfy this condition are considered to be authorised without requiring any further analysis or licensing activity.

(iii) In some situations the coverage contour of the PMP services calculated in section 3.4 2b (ii) may be larger than intended by the licensees. This can result in overlap failures that would not occur in practice. To allow licensing in these cases the prospective PMP operator may nominate a more limited coverage area. In this event the licence must be endorsed with Special Condition FA4.

### 3.5 Protection of PMP receivers from Radiolocation Licences

In addition to protection of radar receivers, potential PMP licensees should consider if a proposed new PMP system will receive interference from radar transmitters. The following text provides a method for determining the interference risk to a proposed PMP system.

It is anticipated that this procedure will be mainly used for coordination and licensing of PMP system receivers, however it is noted that it could also be used for licensing of potential future radar transmitters.

Note: To maximise spectrum availability for both radiolocation and PMP services, it is expected that licensing of any new radiolocation services would be limited to the 5620-5630 MHz band unless it is unavailable due to coordination requirements with existing services.

#### Radiolocation transmitter → PMP Base station receiver coordination

1. Area Cull: Identify any 5.6 GHz band radar transmitters that are included in the RRL or in **Annex D** of this RALI that are within 500 km of the location of the proposed PMP base station receiver.
2. Coordination is required with any PMP base station receivers identified in the Area Cull. In order to manage interference, two separate scenarios need to be assessed.
  - a. Base stations: Emissions from a 5.6 GHz band radiolocation transmitter into a PMP receiver should not exceed the values in the table below.

**Table 5: Protection criteria (not to be exceeded for 20% of time) for PMP Base Station receivers**

Frequency Offset (between radar and PMP centre frequencies)	Base Station Protection Criteria (at the input of the receiver)		
	(dBm in 10 MHz receiver BW)	(dBm in 15 MHz receiver BW)	(dBm in 20 MHz receiver BW)
Co-channel	-100 dBm	-98 dBm	-97 dBm
10 MHz	-81 dBm	-87 dBm	-92 dBm
15 MHz	-65 dBm	-70 dBm	-76 dBm
17.5 MHz	-62 dBm	-64 dBm	-68 dBm
20 MHz	-59 dBm	-60 dBm	-63 dBm

Note: In the event that these calculations indicate that interference could be received, the prospective PMP licensee may still proceed but the special condition FA3 as described in section 4.3 must be attached to the licence.

- b. Remote stations: The base station receiver protection condition in 2a is considered adequate to manage interference to remote stations in most cases. However, in the event interference does occur, section 3.3 of this RALI applies.

### 3.6 Site Engineering Aspects

It is not anticipated that PMP systems and radar systems will be located at shared sites or even at sites that are close to each other. However, it is conceivable that in some situations PMP systems may be located at shared sites or sites in close proximity to each other.

At shared sites, or sites in close proximity (i.e. sites within 500 m of each other), a number of potential interference mechanisms other than co-channel or adjacent channel interference may occur. These include: intermodulation; transient and spurious emissions; receiver and desensitisation; and physical blocking. These mechanisms are caused by non-linear and often complex processes that are, usually, not readily predicted using information contained in the ACMA's RRL. Nevertheless, a number of "site engineering" methods can be applied to address these potential interference scenarios. These include, but are not limited to, RF filtering, site shielding, frequency separation, site location and power reduction.

Most of the above-mentioned methods require co-operation and co-ordination between licensees. This is most easily achieved where the two systems are owned by the same licensee. However, neighbouring systems are seldom owned by the same licensee, and therefore formal discussions may be required.

In the case of co-siting with spectrum licensed devices (i.e. sites within 500 m of each other), if interference occurs and both devices are operating in accordance with the condition of their licence and any other conditions that may apply, then licensees must take reasonable steps to negotiate arrangements likely to reduce the interference to acceptable levels.

It is expected that licensees (or their site managers) will work cooperatively and apply good site engineering practice to resolve problems if and when they occur.

## 4. Licensing

### 4.1 Overview of Licensing

This RALI defines the licensing and assignment rules for the issue of fixed PMP and radiolocation apparatus licences.

The operation of radiocommunications equipment authorised by a PMP or radiolocation licence is subject to:

- > conditions specified in the *Radiocommunications Act 1992* (the Act), including an obligation to comply with the Act;
- > conditions specified in the [\*Radiocommunications Licence Conditions \(Apparatus Licence\) Determination 2015\*](#) and any other determinations made by the ACMA under paragraph 107(1)(f) of the Act;
- > conditions specified in the licence; and
- > any further conditions imposed by the ACMA under section 111 of the Act.

### 4.2 Conditions included in the Fixed LCD

The [\*Radiocommunications Licence Conditions \(Fixed Licence\) Determination 2015\*](#) (the Fixed LCD) allows multiple stations to operate under one spectrum access. It also includes generic conditions that apply to all fixed point-to-multipoint licences.

It is expected that 5.6 GHz band PMP licensees will take reasonable steps to enable compatibility between adjacent frequency PMP apparatus licensed services. To enforce this, the adjacent channel interference condition for PMP systems in section 11T of the Fixed LCD has been revised to include the 5600-5620 and 5630-5650 MHz frequency ranges.

#### Adjacent channel interference

(1) If the station is a base station that operates using time division duplex in the 1900 MHz to 1920 MHz band, the 3400 MHz to 3700 MHz band, the 5600 MHz to 5620 MHz band or the 5630 to 5650 MHz band, the licensee:

(a) must not cause harmful interference to a base station receiver operating on an adjacent channel that:

- (i) operates using time division duplex; and
- (ii) is operated in accordance with its licence; and

(b) cannot claim protection from harmful interference caused by a base station operating on an adjacent channel that:

- (i) operates using time division duplex; and
- (ii) is operated in accordance with its licence.

(2) The licensee is taken to have complied with subsection (1) in relation to another licensee if the licensee:

- (a) align transmission and reception timing as soon as practicable to avoid the interference;
- or
- (b) make other arrangements that avoid the interference.

(3) In this section:

**adjacent channel**, in relation to a licence, means a frequency band that:

- (a) is within the 1 GHz to 275 GHz frequency band; and
- (b) is immediately adjacent to the frequency band to which the licence relates.

### 4.3 Special Conditions

Conditions of operation which apply to an individual licence, will be printed on the licence under the heading 'Special Conditions'. The application of special conditions by the ACMA will be considered on a case-by-case basis as required.



**Special Condition FA3**

In the event that a radiolocation transmitter into a PMP receiver coordination calculation fails to achieve the required protection level the prospective licensee may consider that, in view of the small percentage of time for which the interference threshold is exceeded, it is reasonable to accept the predicted interference risk. Should the applicant decide to accept the risk involved in operating a receiver under these circumstances, the PMP licence may be granted provided the following special condition is attached to the licence:

*The licensee has agreed to accept interference from one or more 5.6 GHz band radiolocation stations that were included in coordination calculations at the time when the P-MP system was licensed.*

**Special Condition FA4**

In the event that a PMP remote station transmitter fails to achieve the compatibility condition spelt out in section 3.4 2b (i) and (ii), licensing may proceed if the prospective licensee agrees that their PMP coverage area will not include areas where the condition of section 3.4 2b (i) and (ii) is not achieved. Should the applicant decide to accept this limitation on remote station deployment, the PMP licence may be granted provided the following special condition is attached to the licence:

*Calculations have indicated that at some locations the coordination requirement of section 3.4 2b (i) and (ii) of RALI FX-23 has not been met. The licensee has agreed that remote stations shall not be deployed at those locations.*

**4.4 Advisory Notes**

At this stage no situations requiring the addition of advisory notes to licences have been identified.

**4.5 Additional Information on Technical Records**

The following applies when providing details of PMP base station transmitters and receivers to be recorded on the Register of Radiocommunications Licences:

- > To ensure compliance with the maximum in-band power limit it is essential that transmitter power and antenna gain (and/or EIRP), antenna pattern and down-tilt be provided for each proposed assignment;
- > Where sectorised antennas are used, details of the antenna model, down-tilt, polarisation and azimuth should be recorded for each sector;
- > However, where:
  - > there are multiple sectorised antennas on a single site (used, for example, to achieve 360° coverage); and
  - > all sectors are using the same frequency,
 it is not necessary to specify the azimuth of each sector antenna. Instead, the site can be recorded as a single registration (i.e. effectively registering the device as non-directional). When performing coordination, the highest radiated power on any one sector should be assumed in all directions – irrespective of the actual antenna configuration. The details of the antenna on the sector that results in the highest radiated power should be recorded on the RRL.
- > Where steerable beam (including beam forming) antennas are used, details of the highest gain achievable through antenna phasing should be recorded.



## 5. Exceptions

Exceptions to the requirements of this RALI for prospective assignments require case-by-case consideration by the Manager, Spectrum Planning Section.

A request for exemption from the requirements of this RALI would need to be accompanied by evidence to support the request.

All requests for exemptions should be submitted to [fregplan@acma.gov.au](mailto:fregplan@acma.gov.au).

## 6. RALI Authorisation

Approved 11/12/23  
Andrew Stewart  
Acting Manager  
Spectrum Planning Section  
Spectrum Planning and Engineering Branch  
Australian Communications and Media Authority

## 6. References

1. *ITU-R Recommendation [P.452](#)* "Prediction procedure for the evaluation of interference between stations on the surface of the Earth at frequencies above about 0.1 GHz"
2. *[Radiocommunications Licence Conditions \(Apparatus Licence\) Determination 2015](#)*
3. *[Radiocommunications Licence Conditions \(Fixed Licence\) Determination 2015](#)*
4. ETSI EN 302 085 V1.2.3 "Fixed Radio Systems; Point-to-Multipoint Antennas; Antennas for point-to-multipoint fixed radio systems in the 3 GHz to 11 GHz band"
5. ITU-R Recommendation M.1851 "Mathematical models for radiolocation radar systems antenna patterns for use in interference analyses"

# Annex A: Out-of-band and Spurious Emission Levels

## A1. Licensed PMP Base Stations

Licensed PMP base stations are required to comply with the out-of-band and spurious emission limits set out in this section.

### Out-of-band emission limits<sup>1</sup>

The out-of-band emission limits for PMP transmitters are set out in Table A.1.

**Table A.1: Out-of-band emission limits**

Offset Frequency ( $f_d$ ) (% of equipment bandwidth)	Minimum attenuation (dB)
$0 <  f_d  \leq 50$	0
$50 <  f_d  \leq 55$	$26 + 145 * \log_{10}(f_d/50)$
$55 <  f_d  \leq 100$	$32 + 31 * \log_{10}(f_d/55)$
$100 <  f_d  \leq 150$	$40 + 57 * \log_{10}(f_d/100)$
$ f_d  > 150$	50

Where:

$$f_d(\%) = ((f - f_c) / \text{channel bandwidth}) \times 100,$$

$$f_c = \text{channel centre frequency}$$

Note: Measurement methods and measurement bandwidths for assessing compliance with these limits shall conform with section 4.3 of Industry Canada document RSS-111 Issue 5 (posted on Industry Canada website September 4, 2014).

### Spurious emission limits

PMP licensee must ensure that radiocommunications devices operated under the licence do not exceed the transmitter and receiver spurious emission limits defined in this section.

For radiocommunications transmitters operated under the licence, the spurious emission limits in Table A.2 apply at frequencies outside the 5560-5690 MHz frequency range<sup>2</sup>.

**Table A.2: Radiocommunications transmitter spurious emission limits**

Frequency range (f)	Conducted Mean power or Total Radiated Power (dBm)	Measurement Bandwidth
$9 \text{ kHz} \leq f < 150 \text{ kHz}$	-36	1 kHz
$150 \text{ kHz} \leq f < 30 \text{ MHz}$	-36	10 kHz

<sup>1</sup> These values are taken from the High power transmitter mask in Industry Canada document RS-111, Issue 5

<sup>2</sup> This range applies for 20 MHz bandwidth P-MP systems. For 10 MHz bandwidth P-MP systems, the out-of-band to spurious transition points are at 5580 MHz and 5670 MHz.

$30 \text{ MHz} \leq f < 1 \text{ GHz}$	-36	100 kHz
$1 \text{ GHz} \leq f < 26 \text{ GHz}$	-30	1 MHz

## A2. PMP Remote stations

Remote stations of PMP systems authorised to operate under a PMP licence or which have been individually licensed are required to comply with the out-of-band and spurious emission limits set out in section A1.

## A3. Radiolocation stations

Coordination calculations should be based on the assumed radiolocation station spectral masks set out in Tables A.3a and A.3b.

**Table A.3a: Radiolocation receiver spectral mask**

Frequency offset range (from edge of licensed centre frequency)	Relative level (dBc)
$0 \text{ kHz} \leq f_{\text{offset}} < 0.5 \text{ MHz}$	0
$0.5 \text{ MHz} \leq f_{\text{offset}} < 3.8 \text{ MHz}$	$80 * ( f_{\text{offset}}  - 0.5) / 3.3$
$f_{\text{offset}} \geq 3.8 \text{ MHz}$	80

**Table A.3b: Radiolocation transmitter spectral mask**

Frequency offset range (from edge of licensed centre frequency)	Relative level (dBc)
$0 \text{ kHz} \leq  f_{\text{offset}}  < 2 \text{ MHz}$	0
$2 \text{ MHz} \leq  f_{\text{offset}}  < 12 \text{ MHz}$	$35 * ( f_{\text{offset}}  - 2) / 10$
$12 \text{ MHz} \leq  f_{\text{offset}}  < 25 \text{ MHz}$	$35 - 15 * ( f_{\text{offset}}  - 12) / 13$
$ f_{\text{offset}}  \geq 25 \text{ MHz}$	50

## Annex B: Area in which licensing is permitted

The HCIS coordinates below can be converted into a Placemark file (viewable in Google Earth) through a facility on the ACMA website: [www.acma.gov.au/theACMA/convert-hcis-area-description-to-a-placemark](http://www.acma.gov.au/theACMA/convert-hcis-area-description-to-a-placemark).

**Table B.1: Description of Areas in which licensing of 5.6 GHz band PMP base stations is permitted**

Area Name	HCIS
RALI FX 23 permitted areas	CV, DV, IV, JV, JW, KQ, KV, KW, LR, LV, LW, LY, MS, MT, MU, AU9, AV9, AW3, BU7, BU8, BV3, BV6, BV7, BV8, BV9, BW1, BW2, BW3, BW5, BW6, CW1, CW2, CW3, CW4, DW1, DW2, DW3, EV1, EV2, EV3, EV4, EV5, EV6, EV7, FV1, FV2, FV3, FV4, FV5, GV1, GV2, GV3, GV6, HV1, HV2, HV3, HV4, HV5, HV6, HV8, HV9, HW3, HW6, IW1, IW2, IW4, IW5, IW7, IW8, IW9, JX1, JX2, JX3, JX5, JX6, KO1, KO4, KO5, KO7, KO8, KP1, KP2, KP4, KP5, KP6, KP7, KP8, KP9, KX1, KX2, KX4, KX5, KX8, KX9, KY2, KY3, KY6, LP4, LP7, LQ1, LQ2, LQ4, LQ5, LQ7, LQ8, LX2, LX3, LX5, LX6, LX7, LX8, LX9, LZ1, LZ2, LZ3, MR1, MR4, MR5, MR7, MR8, MR9, MV1, MV2, MV3, MV4, MV5, MV6, MV7, MV8, MW1, MW2, MW6, MW7, MW8, MW9, MX1, MX2, MX3, MX4, MX7, MY1, MY4, MY7, MZ1, NS4, NS7, NS8, NS9, NT1, NT2, NT3, NT4, NT7, NU1, NU2, NU4, NU5, NU6, NU7, NU8, NU9, NV1, NV2, NV3, NV5, AU6I, AU6J, AU6K, AU6L, AU6M, AU6N, AU6O, AU6P, BU4H, BU4I, BU4J, BU4K, BU4L, BU4M, BU4N, BU4O, BU4P, BU5E, BU5F, BU5G, BU5H, BU5I, BU5J, BU5K, BU5L, BU5M, BU5N, BU5O, BU5P, BU9A, BU9B, BU9E, BU9F, BU9I, BU9J, BU9M, BU9N, BV2C, BV2D, BV2G, BV2H, BV2K, BV2L, BV2O, BV2P, BV4M, BV4N, BV4O, BV4P, BV5C, BV5D, BV5G, BV5H, BV5K, BV5L, BV5M, BV5N, BV5O, BV5P, IW3A, IW3B, IW3C, IW3D, IW3E, IW3F, IW3G, IW3H, IW3I, IW3M, IW6A, IW6E, IW6I, IW6J, IW6K, IW6L, IW6M, IW6N, IW6O, IW6P, KX3A, KX3B, KX3C, KX3D, KX3E, KX3F, KX3G, KX3H, KX3I, KX3M, KX6A, KX6E, KX6I, KX6J, KX6K, KX6L, KX6M, KX6N, KX6O, KX6P, LX1A, LX1B, LX1C, LX1D, LX1E, LX1F, LX1G, LX1H, LX1L, LX1P, LX4D, LX4H, LX4I, LX4J, LX4K, LX4L, LX4M, LX4N, LX4O, LX4P, MV9A, MV9B, MV9C, MV9E, MV9F, MV9I, MV9J, MV9M, MV9N, MW3A, MW3B, MW3E, MW3F, MW3G, MW3H, MW3I, MW3J, MW3K, MW3L, MW3M, MW3N, MW3O, MW3P, MW4A, MW4B, MW4C, MW4E, MW4F, MW4G, MW4I, MW4J, MW4K, MW4M, MW4N, MW4O, MW4P, MW5C, MW5D, MW5G, MW5H, MW5K, MW5L, MW5M, MW5N, MW5O, MW5P, NT5A, NT5B, NT5C, NT5D, NT5E, NT5F, NT5G, NT5H, NT5I, NT5J, NT5K, NT5L, NT5M, NT5N, NT5O, NT6A, NT6B, NT6C, NT6D, NT6E, NT6F, NT6G, NT6H, NT6I, NT6J, NT6K, NT6L, NT6P, NT8A, NT8B, NT8C, NT8E, NT8F, NT8I, NT8J, NT8M, NT8N, NT8O, NT9D, NT9H, NT9L, NT9P, NU3D, NU3E, NU3H, NU3I, NU3J, NU3K, NU3L, NU3M, NU3N, NU3O, NU3P, NV4A, NV4B, NV4C, NV4D,

	<p>             NV4E, NV4F, NV4G, NV4H, NV4I, NV4J, NV4K, NV4L,              NV4M, NW1E, NW1F, NW1G, NW1H, NW1I, NW1J,              NW1K, NW1L, NW1M, NW1N, NW1O, NW1P, BV1A1,              BV1A2, BV1A3, BV1B1, BV1B2, BV1B3, BV1C1, BV1C2,              BV1C3, BV1D1, BV1D2, BV1D3, BV2A1, BV2A2, BV2A3,              BV2B1, BV2B2, BV2B3, BV4I7, BV4I8, BV4I9, BV4J7,              BV4J8, BV4J9, BV4K7, BV4K8, BV4K9, BV4L7, BV4L8,              BV4L9, BV5I7, BV5I8, BV5I9, BV5J7, BV5J8, BV5J9,              IW3J1, IW3J2, IW3J3, IW3J4, IW3J7, IW3K1, IW3K2,              IW3K3, IW3L1, IW3L2, IW3L3, IW3N1, IW3N4, IW3N7,              IW6B1, IW6B4, IW6B7, IW6F1, IW6F4, IW6F7, IW6F8,              IW6F9, IW6G7, IW6G8, IW6G9, IW6H7, IW6H8, IW6H9,              KX6F7, KX6F8, KX6F9, KX6G7, KX6G8, KX6G9, KX6H7,              KX6H8, KX6H9, LX1K2, LX1K3, LX1K5, LX1K6, LX1K8,              LX1K9, LX1O2, LX1O3, LX1O5, LX1O6, LX1O8, LX1O9,              LX4C2, LX4C3, LX4C5, LX4C6, LX4C8, LX4C9, LX4E7,              LX4E8, LX4E9, LX4F7, LX4F8, LX4F9, LX4G2, LX4G3,              LX4G5, LX4G6, LX4G7, LX4G8, LX4G9, MV9D1, MV9D2,              MV9D3, MV9D4, MV9D5, MV9D6, MV9D7, MV9D8,              MV9G1, MV9G2, MV9G3, MV9G4, MV9G5, MV9G6,              MV9H1, MV9H2, MV9H4, MV9H5, MW3C1, MW3C4,              MW3C7, MW3C8, MW4D1, MW4D2, MW4D4, MW4D5,              MW4D7, MW4D8, MW4H1, MW4H2, MW4H4, MW4H5,              MW4H7, MW4H8, MW4L1, MW4L2, MW4L4, MW4L5,              MW4L6, MW4L7, MW4L8, MW4L9, MW5B3, MW5B6,              MW5B9, MW5F3, MW5F6, MW5F9, MW5I4, MW5I5,              MW5I6, MW5I7, MW5I8, MW5I9, MW5J3, MW5J4, MW5J5,              MW5J6, MW5J7, MW5J8, MW5J9, NT5P1, NT5P2, NT5P3,              NT5P4, NT5P5, NT5P6, NT5P7, NT6M1, NT6M2, NT6M3,              NT6M4, NT6M5, NT6M6, NT6N1, NT6N2, NT6N3, NT6N4,              NT6N5, NT6N6, NT6O1, NT6O2, NT6O3, NT6O4, NT6O5,              NT6O6, NT6O9, NT8D1, NT8D4, NT8D7, NT8G1, NT8G2,              NT8G3, NT8G4, NT8G5, NT8G6, NT8H1, NT8H4, NT8P7,              NT8P8, NT8P9, NT9C3, NT9C6, NT9C9, NT9G3, NT9G6,              NT9G9, NT9K3, NT9K6, NT9K9, NT9O3, NT9O6, NT9O9,              NU3A1, NU3A4, NU3A7, NU3A8, NU3A9, NU3C3, NU3C6,              NU3C9, NU3F4, NU3F5, NU3F6, NU3F7, NU3F8, NU3F9,              NU3G3, NU3G4, NU3G5, NU3G6, NU3G7, NU3G8,              NU3G9, NV4N1, NV4N2, NV4N3, NV4N4, NV4N5, NV4N7,              NV4N8, NV4O1, NV4O2, NV4O3, NV4P1, NV4P2, NV4P3,              NV7A1, NV7A2, NV7A3, NV7A4, NV7A5, NV7A6, NV7B1,              NV7B2, NV7B4, NV7B5.           </p>
--	--

*Note* The HCIS is described in the *Australian Spectrum Map Grid 2012*. The *Australian Spectrum Map Grid 2012* is available on the ACMA website at: [www.acma.gov.au](http://www.acma.gov.au). Copies are also available from the ACMA.

## Annex C: Notification requirements

When notifying licensees the following information (as a minimum) must be provided:

- > The reason the licensee is being notified, for example:
  - In accordance with section 3.2 of RALI FX 23, [the licensee] is being notified of a proposed new PMP service that will be operated adjacent to [one/a number] of your existing licensed PMP services;
- > Information identifying the affected licensed service or services (e.g. licence number, site ID);
- > Details of the proposed PMP service required for the coordination of services (e.g. Location, transmitter characteristics, receiver characteristics etc.);
- > Contact details of an appropriate person for further discussion of the issue.

## Annex D: Parameter values for Radar site co-ordination

The locations in the table below have been identified as potential sites for future weather radars. Several sites have been identified in each area to preserve the options available to BoM as they go through their planning process. The ACMA will remove (or add) sites as the final location of a new radar becomes clearer.

Site name	State	Lat (GDA94, dec deg)	Long (GDA94, dec deg)	Centre frequency (MHz)	Bandwidth (MHz)	Pulse width (ns)	Antenna diameter (m)	3 dB beamwidth (°)	Min up-tilt angle (°)	Tx power (kW)	Ant gain (dBi)	EIRP (dBW)	Ant height (m AGL)
Bybera – Boggabilla	QLD	-28.1927	151.0403	5625	6	500	4.1	1	0.5	400	45	101	20
Goondwindi - Boggabilla	QLD	-28.5223	150.3266	5625	6	500	4.1	1	0.5	400	45	101	20