

Replanning the 3700–4200 MHz band

Outcomes paper

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Executive summary

Spectrum in the 3700–4200 MHz band is the subject of considerable interest globally as suitable mid band spectrum for a range of applications, including fixed satellite services and wireless broadband (WBB) such as 5G.

Current Australian regulatory arrangements in the 3700–4200 MHz band are optimised to support the following mixture of uses: apparatus licensed point-to-point fixed service links (PTP), coordinated fixed satellite service (FSS) receive earth stations, and various low power class licensed devices.¹

As the current framework in the 3700–4200 MHz band does not support wireless broadband (WBB) uses, the view of the Australian Communication and Media Authority (ACMA) expressed in the [replanning of the 3700–4200 MHz band options paper](#) ('options paper') of July 2020, was that a clear case existed for reviewing and potentially changing the spectrum management framework in the band.

The options paper identified the case for change and proposed three preliminary planning options for consideration. These options were intended to facilitate the introduction of new wireless broadband services and applications in the band, while preserving spectrum for existing uses. We identified a set of desirable planning outcomes which considered the legislative and policy framework and environmental factors, including aims to:

1. Introduce wide area WBB and local area WBB uses with suitable frameworks.
2. Support a range of continuing uses in the band, in particular:
 - A. Ongoing coordinated FSS use in some form and maintain the existing policy of not supporting or protecting unlicensed FSS earth stations.
 - B. Point to Point (PTP) use in some form.
 - C. Radiodetermination services operated by the Department of Defence.
 - D. Earth Station Protection Zones (ESPZ)
 - E. Class licence arrangements for building material analysis/ground penetrating radar and ultrawide band devices. (paragraph 3(d) of the Act).
3. Ensure coexistence with adjacent band services is addressed. This includes radio altimeters operating above 4200 MHz, and existing spectrum and apparatus licensed services below 3700 MHz. (see Appendix A—Desirable planning outcomes).

These desirable planning outcomes guided the assessment of the options considering changes in the licensing arrangements in the band. We sought information from stakeholders to inform the consideration of a preferred planning approach.

Based on feedback to the options paper and consideration of subsequent domestic and international developments that may impact the potential future use of the band, the ACMA has concluded that arrangements in the band should be changed to maximise the overall public benefit derived from its use and that, consistent with the planning decisions and preliminary views expressed below, the 3700-4200 MHz band

¹ While there is no radiodetermination service allocation in the band, several radiodetermination licences have been issued under section 10(7) of the Australian Radiofrequency Spectrum Plan 2017.

should advance to the implementation stage of the band planning process to enable WBB uses in parts of the band.

This paper concludes the ACMA's band planning activities by identifying planning outcomes. The ACMA will move to implement the planning decisions which will include the development of technical planning frameworks (including further consultation where necessary) and detailed licensing, allocation and pricing considerations. Planning outcomes identified at this stage include both ACMA planning decisions as well as preliminary views on these future activities, some of which may be subject to further legislative or consultative processes.

Industry feedback and ACMA considerations

Feedback to the options paper affirmed the identified range of uses by interested parties in the band, with key differences in views around the various frequency break points between different planning/licensing arrangements in the band and quantum of spectrum required to support particular use cases.

Overall, there is evidence of competing demands for access to the band as divergent views were expressed between industry sectors. The satellite sector questioned the need for supporting WBB in the band while the telecommunications sector supported such use, including calling for additional spectrum to be made available under various mechanisms (such as the use of dynamic spectrum access arrangements).

Coexistence with radio altimeters operating above 4200 MHz, the status of PTP links supporting Universal Service Obligation (USO) services and the status of unlicensed FSS earth station were also identified as key issues in submissions.

The ACMA's preliminary preferred option (Option 3) proposed 100 MHz of spectrum exclusively via spectrum licensing optimised for WA WBB services in metropolitan and regional areas in 3700–3800 MHz. No compelling arguments were provided in submissions to support making more spectrum exclusively available for WA WBB use than initially proposed by the ACMA. Adding this 100 MHz of spectrum to that available in the wider 3300–4200 MHz band optimised for WA WBB exclusively (e.g., via spectrum licensing) will make a total of 400 MHz available in metropolitan areas and 335-365 MHz in regional areas. This is consistent with the regular claims from the mobile sector that 100 MHz per operator is necessary in metropolitan areas and 60-80 MHz in regional areas.

Depending on decisions made implementing the outcomes detailed in this paper, there may also be the opportunity for 3.4 GHz spectrum licensees to obtain useful, non-exclusive, spectrum in the portion of the band being made available for LA WBB in metro and regional areas. The LA WBB spectrum will be available on a first-in-time coordinated basis with PTP links and FSS earth stations. This strikes a balance between making more spectrum available for WBB use with the reducing effect of changes on incumbent services. In particular, the ACMA notes that the number of existing earth stations operating above 3800 MHz is considerable in some cities. Expanding the range for spectrum licensing above this would result in a step change in disruptions to FSS users due to a requirement for them to clear the band.

The ACMA considers that a 200 MHz guard band between WBB and radio altimeters is sufficient². This arrangement permits LA WBB to be supported in the 3800–4000

² While the ACMA considers a 200 MHz guard band should be sufficient, coexistence would be further considered in the development of detailed technical frameworks for WBB (especially in 3900-4000 MHz).

MHz range and allows existing and future apparatus licensed and coordinated FSS stations to continue on a shared basis. While this arrangement would make 200 MHz notionally available for LA WBB, in some areas less spectrum is likely to be able to be used in some areas due to the need to protect existing FSS earth stations.

The ACMA considers making a reasonable amount of spectrum available for LA WBB in a manner suitable for small and medium enterprises is consistent with encouraging a diverse range of users and services (for example enterprise network private 'LTE' etc) in a key 5G band with a good balance of propagation and capacity, and a growing global ecosystem. The Government is currently seeking to support business to try such new and innovative technology solutions under its \$22.1 million [Australian 5G Innovation Initiative](#).

While acknowledging concerns from the satellite industry that licensed FSS use should not be impacted by changes, the ACMA observes that under the planning outcomes detailed in this paper, existing FSS and new licensed FSS use would not be significantly affected across most of the country and the band. FSS use in 100 MHz (3700-3800 MHz) would be subject to transition requirements over time but the impact can be mitigated by an appropriate transition period.

The issue of unlicensed FSS use (especially by national broadcasters) was confirmed in submissions. The ACMA remains of the view that if interference protection is required then services must be licensed.

The ACMA recognises the importance of ensuring Telstra can still meet its universal service obligations for voice services using PTP links in the band. In our view, this can be managed by providing a suitable reallocation/transition period as well as more flexible technical arrangements for PTP services in the band.

Satellite industry interest in Earth station protection zones (ESPZs) were confirmed. The ACMA reaffirms its existing policy to use ESPZs as a means of providing increased confidence to the satellite industry regarding the deployment of infrastructure. This includes retaining the existing ESPZ in Western Australia and the three in Eastern Australia (plus the small Uralla ESPZ) that will include protection for FSS receive in the band. Depending on usage of the existing ESPZs, there may be a case for the ACMA to look at rationalising the number of east coast ESPZs at an appropriate time, for example at the end of any reallocation period affecting FSS.

We note the feedback on the desire to use Dynamic Spectrum Access (DSA) techniques in the band for accommodating LA WBB services. ACMA reaffirms its views from the 3.6 GHz decisions and preliminary views [paper](#) that it does not consider that DSA offers practical sharing models will provide the desired certainty of long-term access to users of the band. Rather, the ACMA considers the provision of a considerable amount (200 MHz in metropolitan and regional areas and 300 MHz in remote areas) of additional apparatus licensed, coordinated and protected spectrum offers a range of spectrum access options to meet LA WBB demand.

This would provide further opportunity to implement any necessary technical conditions (likely only in the apparatus licensed segment of the band) to protect adjacent band radio altimeters.

Planning decisions and preliminary views

Overall, the ACMA concludes arrangements broadly consistent with its preliminary preferred option (Option 3) are expected to maximise the overall public benefit derived from use of the band.

Key planning decisions identified for the 3700–4200 MHz band are consistent with a variation of arrangements proposed under Option 3 of the options paper, with an upper limit of changes of 4000 MHz and is illustrated in Figure 1. This involves:

- > In metropolitan and regional areas in the 3700–3800 MHz range, clearing (over a period of time) existing FSS and PTP services and introducing arrangements to allow for WA WBB services on an exclusive basis. The ACMA is of the preliminary view that spectrum licensing is the preferred licensing mechanism for WA WBB uses and a five year re-allocation period for existing licensed PTP and FSS services is appropriate.
- > In remote areas in the 3700–3800 MHz range, introducing apparatus licensing arrangements to support LA WBB services on a shared basis with existing FSS and PTP services. New apparatus licensed FSS will be permitted on a coordinated, shared basis with LA WBB. However, the ACMA will adopt a policy of restricting the issue of new PTP licences. The ACMA will further investigate the most appropriate apparatus licence type to use to authorise LA WBB in this case.
- > Australia-wide, in the 3800–4000 MHz range, introducing arrangements to support LA WBB services on a shared basis with existing FSS and PTP services. New apparatus licences for FSS and PTP services would be issued on a coordinated, shared basis with LA WBB. The ACMA is of the preliminary view that the area-wide licence type of apparatus licence would be the preferred licensing mechanism for LA WBB uses in regional areas.
- > Australia-wide, retaining use of the 4000–4200 MHz range for apparatus licensed FSS and PTP services only, and varying PTP arrangements in other parts of the band if required to be consistent with this decision.
- > Maintaining existing arrangements for the licensed radiolocation services and devices operating under class licences.
- > Maintaining ESPZs and arrangements under RALI [MS44](#) during implementation of new arrangements³. The ACMA does not propose these areas be identified for spectrum licensing or issuing apparatus licences other than for FSS earth station receivers in the band.
- > Changing arrangements for scientific unassigned licences so they do not authorise operation of devices in areas/segments re-allocated for spectrum licensing.

The ACMA has formed the view that this combination of measures will maximise the overall public benefit derived from use of the band at this point in time, by making parts of the band available for WA WBB (such as those typically provided by mobile network operators) and LA WBB services (such as those provided by wireless internet service providers and for private network uses). At the same time, it permits continued use by FSS and PTP services in most of the band nationwide and maintains coexistence with radio altimeters operating above 4200 MHz. While a number of existing apparatus-licensed services will be affected by the replanning process, transitional arrangements and, where possible, alternative spectrum access arrangements have been identified.

³ The ACMA may review ESPZ arrangements, including assessing whether all of the eastern ESPZs are still required in the band.

Based on the outcomes identified in this paper, a summary of the overall proposed configuration for the 3700–4200 MHz band is shown in

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Figure 1 of the *Planning decisions and preliminary views* chapter.

Next steps

A high level implementation plan has been developed and is outlined in Table 1 of the *Next steps* chapter.

In developing the next steps, the ACMA has acknowledged the synergies between outcomes in the 3700-4200 MHz band and decisions already made in the 3.4 GHz (3400–3700 MHz) band. The ACMA sees value in aligning the implementation stages for segments of these bands in some geographies. For example, by coordinating access in remote parts of Australia in the 3.4 GHz band and the 3700-4000 MHz band that will be available under this process and making some regional spectrum in both bands under apparatus licensing and some segments for spectrum licensing in both bands.

In addition to the allocation of spectrum licensing in defined areas in both bands, collectively the planning outcomes in both bands will result in the availability of additional mid band spectrum well suited for LA WBB interests. These outcomes are part of the wider efforts by the ACMA over several years to make more spectrum available for these use types and users in multiple bands (with initiatives in the 26 GHz (24.25–27.5 GHz) and 28 GHz (27.5–29.5 GHz) bands being another example).

Introduction

In July 2020, the ACMA released the [Replanning of the 3700–4200 MHz options paper](#). The options paper presented a case for change in the 3700–4200 MHz band and identified as desirable planning outcomes the:

- > Introduction of WBB use into the band.
- > keeping parts of the band for existing PTP and FSS use.
- > maintaining existing arrangements for class licensed services and apparatus licensed radiodetermination services.
- > ensuring coexistence with adjacent band services is managed.

The options paper also explored sharing and compatibility between services within and adjacent to the 3700–4200 MHz band.

This outcomes paper summarises and considers issues raised in submissions to the options paper. With additional information obtained from submissions it reassesses the options against the desirable planning outcomes for the band (see Appendix A—Desirable planning outcomes) and it identifies planning decisions and preliminary views (the outcomes). This paper provides details on the process, with indicative timeframes that the ACMA intends to follow to implement the outcomes as well as assessing they have been implemented.

While the ACMA will manage and implement key aspects of this process, there are some elements that are dependent on decisions made by the Hon Paul Fletcher MP, Minister for Communications, Cyber Safety and the Arts (for example, designating parts of the spectrum to be allocated by issuing spectrum licences is a currently decision for the Minister⁴).

For the purposes of this paper, ‘metropolitan’, ‘regional’ and ‘remote’ geographical areas are defined at Appendix C.

⁴ See, however, the changes proposed by the Radiocommunications Legislation Amendment (Reform and Modernisation) Bill 2020

Legislative and policy environment

Managing spectrum efficiently and effectively for the benefit of all Australians is a key priority for the ACMA.⁵ The ACMA draws on a range of legislative and administrative tools and overarching guidance in executing its functions.

Some of the matters set out in this section may be affected by the passing of the Radiocommunications Legislation Amendment (Reform and Modernisation) Bill 2020 (Bill) when it commences, See below for more on the Bill.

Guiding legislation and policy

The ACMA's decisions are guided by the object of the [Radiocommunications Act 1992](#) (the Act) to provide for management of the radiofrequency spectrum, in order to (among other goals):

- > maximise—by ensuring the efficient allocation and use of the spectrum—the overall public benefit derived from using the radiofrequency spectrum
- > make adequate provision of the spectrum:
 - i. for use by agencies involved in the defence or national security of Australia, law enforcement or the provision of emergency services
 - ii. for use by other public or community services.
- > provide a responsive and flexible approach to meeting the needs of spectrum users
- > encourage the use of efficient radiocommunication technologies so that a wide range of services of an adequate quality can be provided
- > support the communications policy objectives of the Australian Government.

Several communications policy objectives relevant to the replanning considerations in the 3700–4200 MHz band have been identified.

The [5G—Enabling the future economy](#) strategy, released in 2017, committed to government action to support the timely rollout of 5G in Australia, including making spectrum available in a timely manner.

[Australia's Tech Future](#), released in December 2018, sets out the Australian Government strategy for Australia's tech future. The strategy presents a vision that Australians have access to world-class digital infrastructure in their personal and working lives with the following outcomes:

- > Australians have reliable, secure and affordable access to high-speed broadband and mobile communications.
- > Australia's communications sector is sustainable and competitive.
- > Australia's world-leading navigation and positioning infrastructure supports emerging technologies.
- > Australia's researchers have the specialised high-performing computing and data infrastructure needed to stay ahead in everything from health to agriculture.

The [Australian Civil Space Strategy 2019–2028](#) is an Australian Government strategy to deliver a globally responsible and respected space sector that lifts the broader economy, and inspires and improves the lives of Australians. It contains a number of [priority areas](#) that may influence development and deployment of satellite services in the 3700–4200 MHz band.

⁵ ACMA [Corporate plan 2020–21](#)

Other relevant advice

The ACMA notes the [Australian Government response](#) of November 2020 to the parliamentary report [Next Gen Future: Inquiry into the deployment, adoption and application of 5G in Australia](#). In particular, the ACMA acknowledges the government's support for recommendation 1 of the report, which recommended the ACMA finalise spectrum allocations expeditiously and investigate how future spectrum auctions can promote improved market competition for the benefit of consumers.

Licensing arrangements

There are three licensing approaches available to the ACMA for authorising access to spectrum: spectrum, apparatus and class licences. These approaches influence how spectrum replanning options can be developed and implemented.

A spectrum licence authorises the operation of devices within a defined frequency range and geographic area, with a high degree of exclusivity. The geographic area can vary in size and can comprise the entire country. Spectrum licences are usually allocated through an auction process and have typically been utilised in bands used to deploy commercial mobile broadband networks. Spectrum licences may be allocated for up to 15 years.

An inherent feature of spectrum licensing is technological flexibility—that is, the licence conditions and associated technical framework, while usually optimised for an expected technology, specify generic technical conditions³ and do not expressly mandate or limit specific technologies or services. This allows a licensee to deploy any technology that complies with the conditions of the licence. It is up to the licensee to manage interference between their devices (note that the adoption of international standards within the technical framework mitigates the potential for interference between devices).

Spectrum licences are more conducive to secondary trading than apparatus licences, due to design features such as their longer tenure and their ability to be sub-divided.

An apparatus licence authorises the use of a radiocommunications device (or group of devices) operating under a specific radiocommunications service type, in a specific frequency range, and traditionally at one or more specific geographic locations for a period of up to five years. They are typically issued 'over-the-counter' in accordance with coordination policies developed by the ACMA. The ACMA [imposes cost recovery charges, and separate legislation imposes taxes](#), in relation to apparatus licences.

These amounts cover our costs and give people incentive to use spectrum efficiently. The ACMA recently created a new apparatus licence type—the [area-wide apparatus licence](#). This authorises the operation of one or more radiocommunications devices within a defined geographic area within frequencies specified in the licence, subject to the conditions included on the issued licence. The licence type is proposed to be scalable, enabling its use for authorising different-sized geographic areas and bandwidths. Unlike existing apparatus licence types—which typically align with specific uses and purposes—the area-wide apparatus licence will be capable of authorising a variety of services, uses, applications and technologies.

Class licences are a standing authorisation to access spectrum without the need to apply to the ACMA for an individual licence (hence taxes or charges are paid), subject to the conditions of the relevant class licence. These conditions include technical and geographic matters and/or pertain to the type of use or class of user.

Spectrum planning outcomes development

We are guided in our spectrum management functions by [the object of the Act](#), set out in its section 3. A balanced application of regulatory and market mechanisms is often necessary in order to achieve key elements of the object of the Act, in particular maximising the overall public benefit from the efficient allocation and use of the radiofrequency spectrum and meeting the government's policy objectives.

The options paper explained the approach the ACMA used in developing and assessing preliminary replanning options for the 3700–4200 MHz band. This led to formation of the ACMA’s preliminary preferred option for replanning the band.

In determining the replanning outcomes presented in this paper, the ACMA has carefully considered submissions to the options paper. We have also taken into account other relevant developments, both domestic and international, that may impact the potential future use of the band.

Following release of this paper, we will consult further on proposed licensing and technical planning arrangements as outlined in the next steps section below.

Issues not within the scope of this paper

The following issues are not within the scope of this paper:

Apparatus tax arrangements

A review of the apparatus licence tax arrangements that apply to different services is not within the scope of this paper. The ACMA is seeking feedback from industry on its general review of apparatus licence taxes as part of the consultations on the implementation of the [Spectrum Pricing Review](#) and its annual work program, the [Five-year spectrum outlook](#). Interested parties are invited to provide their views on apparatus licence taxes in the 3700–4200 MHz band as part of those processes.

Engagement in international activities

The scope of this paper does not extend to Australian strategies or positions on matters under consideration in international spectrum management forums, such as the International Telecommunication Union (ITU) or Asia-Pacific Telecommunity (APT). These matters are dealt with separately through relevant preparatory processes led by the ACMA and/or the Department of Infrastructure, Transport, Regional Development and Communications. Stakeholders interested in these processes can find more information from the [ACMA website](#) or by contacting either the ACMA’s International Radiocommunications Section (irs@acma.gov.au) or the Department’s International Radiocommunications Section (wrc@communications.gov.au).

The Bill

During the 3700–4200 MHz replanning process, the Bill and accompanying tax-related bills were introduced into the Parliament and enacted. The Act, as amended by the Bill, will give effect to several of the recommendations in the Spectrum Review conducted in 2015, including extending the maximum duration of licence terms.

We will provide updated guidance to industry about the effect of changes made by the Bill on arrangements in the 3700-4200 MHz band, before the amendments commence.

The process to date

This chapter recaps the options proposed in the options paper, identifies issues and themes raised in submissions to the options paper and outlines the ACMA's view on them.

Overall approach to replanning the band

The options paper identified three planning options for the 3700–4200 MHz band. These options would make parts of the band available for WBB use while preserving arrangements for fixed PTP and FSS in part of the band.

These planning options were:

- > Option 1— Introduce arrangements to allow for WBB exclusively in one frequency segment, with no change to current arrangements in the remaining segment.
- > Option 2— Introduce arrangements to allow for WBB sharing with existing services in one frequency segment, with no change to current arrangements in the remaining segment.
- > Option 3— Introduce arrangements to allow for WBB both exclusively and shared with existing services in some segments, with no change to current arrangements in the remaining segment.

Option 3 would clear incumbent users in a frequency segment in metropolitan and regional areas. It would introduce WBB on a shared basis in remote areas in the one frequency segment and Australia-wide in a second frequency segment. It would retain a frequency segment for incumbent services only.

The ACMA identified Option 3 as its preliminary preferred planning option because it was assessed as best achieving the identified desirable planning outcomes, which in summary were to:

- > Introduce new WBB uses, both WA WBB and LA WBB, with suitable technical frameworks.
- > Support continued uses in the band for the following:
 - > FSS use but maintaining no support for unlicensed⁶ FSS earth stations.
 - > PTP use, focused on delivery of USO services.
 - > Radiodetermination services operated by the Department of Defence.
 - > ESPZs, as detailed in RALI MS44, to ensure there are long term options for FSS in the entire 3700–4200 MHz band in some locations.
 - > Class licensing arrangements for building material analysis and ultra-wideband (UWB) devices.
- > Ensure coexistence with adjacent band services, in particular radio altimeters operating above 4200 MHz and services below 3700 MHz.

⁶ FSS receivers generally require a fixed earth receive apparatus licence. See the [Radiocommunications \(Specified Radiocommunications Receivers and Types of Transmitter Licences and Receiver Licences\) Determination 2014](#).

Option 3 was also assessed as achieving the greatest net public benefit compared to other options. The detailed preliminary assessment of the options against the desirable planning outcomes is contained in the options paper.

Discussion of submissions

Twenty public submissions to the options paper were received and can be found on the [ACMA's website](#). Feedback from the submissions have been carefully considered. Several themes emerged from the consultation and this section summarises relevant submissions as they relate to sections of the options paper and, where required, the ACMA's response to them. Not all submissions made comment on all the questions and issues.

Divergent views

The submissions had divergent opinions on the replanning of the 3700–4200 MHz band but confirmed a strong interest in existing and new uses being accommodated in the band.

Case for action and desirable planning outcomes

The mobile industry generally considered that there is now demand for 300 MHz for WBB in the 3700–4200 MHz band in metropolitan areas and in Hobart⁷.

The Communications Alliance Satellite Systems Working Group (CA SSWG), Inmarsat and Intelsat questioned demand for WA WBB in the band and referenced an Ofcom [report](#) indicating that 40 MHz of contiguous spectrum is sufficient for each operator for a number of 5G use cases.

WISPAU agreed there is a strong case for action for the introduction of LA WBB but disagreed with the approach to assessing the best mix of uses and allocation.

Motorola and the Australian Radio Communications Industry Association (ARCIA) supported LA WBB in the band implemented using innovative sharing techniques. ARCIA was also concerned at the perceived lack of consideration of private WBB networks.

Speedcast contended that FSS use is increasing in the band and have provided some updated FSS registration figures for their services. They noted that counting assignments may overlook the fact that a single assignment may cover multiple physical signals.

Optus proposed that the ACMA should prioritise the avoidance of further fragmentation of the wider 3400-4000 MHz band. Facilitating contiguous blocks of spectrum for all licensees should be a key consideration and is consistent with the object of the Act.

The ABC submission noted that the effect upon unlicensed Television Receive Only (TVRO) services should be a consideration when deciding outcomes in the band and assessing the public benefit.

⁷ Not defined as a metropolitan area

ACMA response

The ACMA notes the views on the case for action and considers them at *Appendix B—Updated assessment of options*.

Replanning options

Preferred options by stakeholders can be broadly summarised as:

- > Satellite industry stakeholders, including broadcasters, generally wanted changes minimised or requested continued protection for FSS. Satellite operators favoured Option 2 and broadcasters Option 1 (so that unlicensed FSS services are not interfered with).
- > MNOs and equipment manufacturers were generally of the view that a variation of Option 3 was favourable, with an additional 200 MHz exclusively allocated for WA WBB in metro areas and Hobart in addition to the 100 MHz already proposed in metro and regional areas under Option 3.
- > NBN Co consider themselves a LA WBB operator rather than a WA WBB operator and wanted spectrum separated in frequency from WA WBB to minimise the coordination required.
- > WISP stakeholders generally supported Option 2 using dynamic spectrum access (DSA).

ACMA response

The ACMA notes the views on the replanning options and considers them at *Appendix B—Updated assessment of options*.

Assessment of options and cost benefit analysis

WISPAU disagreed with the assessment methodology. Their view was that allocation for LA WBB should be enabled by DSA as this will permit consumers to choose the service they want.

ARCIA disagreed with revenue being used as a proxy for value in the cost benefit analysis (CBA). The ABC considered the assessment and CBA flawed as it did not consider the public benefit that unlicensed TVRO services provide.

TPG considered the actual costs to retune or relocate FSS are lower than presented and prepared a revised Option 3 cost table for consideration. The Australian Mobile Telephone Association (AMTA) also questioned assumptions but agreed that benefits for any of the proposed options far outweighed the costs.

ACMA response

This feedback is considered at *Appendix B—Updated assessment of options*.

Technical issues

Optus expected harmonisation of all technical conditions from 3400 MHz to the upper bound of any WA WBB allocation in the 3700–4200 MHz band.

Motorola proposed some possible technical conditions for shared use by LA WBB.

Telstra were concerned that small LA WBB operators could create spectrum denial to WA WBB large distances away and do not support its use in metro areas.

TPG provided feedback on the compatibility between WBB and FSS, suggesting that the current guidance and requirements in the [Radiocommunications Advisory Guidelines \(Managing Interference from Spectrum Licensed Transmitters – 3.4 GHz Band\) 2015](#) (RAG) are too conservative and that less interference is expected in practice.

ACMA response

The ACMA will work with stakeholders as part of technical framework development processes during implementation of the planning decisions for both spectrum licensed and apparatus licensed segments to ensure an adequate level of protection and utility for all services.

Wireless Avionics Intra-Communication (WAIC)/radio altimeters

Airservices and Boeing provided useful information on international progress on WBB compatibility with radio altimeters but suggested the introduction of WBB to be limited to a maximum of 3900 MHz (Airservices) and 4000 MHz (Boeing) respectively until compatibility was better understood.

Optus considered that there remains insufficient information to support the 4000–4200 MHz segment of the band to be made available for WBB services at this stage.

ACMA response

The ACMA recognises this as an important compatibility issue that has not been fully assessed internationally (including by the ITU-R). After the options paper consultation ended, the Radio Technical Commission for Aeronautics (RTCA) in the USA published a [report](#) on the potential for 5G services in the 3700–3980 MHz range to interfere with radio altimeters. The report uses similar, but more comprehensive, methodologies to those in the ACMA [study](#) and used measured radio altimeter parameters as tested by the aerospace vehicle systems institute (AVSI⁸). The following observations about the RTCA report are made:

- a) The Interference Tolerance Masks (ITM) determined in the RTCA analysis uses a minimum ground reflectivity of 0.01, based on a minimum testing performance standard under [ED-30](#). The ACMA study used 3.16 based on representative conditions in Australia (a 25 dB difference). Using a very low reflectivity will result in a higher estimated potential for interference. The RTCA/AVSI view is that the altimeters should work (and be protected) in the worst case.
- b) The ITMs used the most conservative of each parameter from any of the set of radio altimeters identified as being applicable for each specific scenario being analysed.
- c) An extra margin of 6 dB is used in the radio altimeter laboratory tests to develop the ITMs to account for testing and advised product variations, rather than testing multiple samples of each radio altimeter to obtain a parameter distribution.
- d) An additional 6 dB “aviation safety margin” is also considered and presented in the results. Its application depends on the determined safety criticality of each analysed scenario.

⁸ Previously referenced in the ACMA study

For many scenarios then, the RTCA study appears conservative compared with median expectations. Boeing supported a minimum 200 MHz guard band from the 4200 MHz boundary. Airservices accepted that provision could be made for WBB services up to 3900 MHz or 4000 MHz once international studies show there is no impact. Consequently, the ACMA considers that compatibility with radio altimeters can be successfully managed with WBB services introduced up to 4000 MHz.

The ACMA notes that the USA, Japan, South Korea and the UK are all introducing WBB arrangements in significant parts of the band (using guard bands of 200 MHz or less). The ACMA will work cooperatively with the industry to develop technical frameworks for both spectrum licensed and apparatus licensed segments of the 3700–4200 MHz band to ensure an adequate level of protection and consider any necessary mitigations, such as in-band or out-of-band emission limits and/or exclusion areas around aerodromes or identified heliports.

ESPZs

SBS welcomed the intent to retain full protection for FSS in the ESPZs. Lockheed Martin Australia (LMA) wanted to ensure that the Uralla ESPZ is excised from any WBB implementation. Optus considered the formal establishment of ESPZs to be a priority, including a potential northern Australia and backup western Australia ESPZ. Speedcast requested 'mini-ESPZs' to be established around its facilities in the band.

Inmarsat stressed the need for protection of operations in the ESPZs throughout the whole of the 3550–4200 MHz band to provide a long-term safe harbour for C-band FSS operations in Australia.

ACMA response

The ACMA reaffirms its intent to retain at least one ESPZ in Western Australia and one in eastern Australia (in addition to the smaller Uralla ESPZ), which will include protection for FSS earth station receivers in the band. Depending on usage of the existing ESPZs the ACMA may look at rationalising the eastern Australia ESPZs at the end of any re-allocation/transition period affecting FSS services, noting that as of the release of the options paper there were no FSS receivers registered in the band in any eastern Australia ESPZ except Uralla. The Uralla ESPZ only provides protection for non-geostationary satellite orbits.

Incumbent PTP services

Telstra provided feedback on the future of PTP services in the band. Telstra sought protection via grandfathering arrangements for three specific PTP link paths in regional areas which are used for the delivery of USO services. They also considered that the retention of channel pairs 4-7⁹ in the PTP channel raster is necessary to support these USO obligations on an ongoing basis for these paths. These channel pairs cover the frequency range 3710–3870 MHz and 4030–4190 MHz. However, its submission to the [2019 discussion paper](#) they stated that if the 3700–3800 MHz range was reallocated to WA WBB services exclusively in metro and regional areas, then channels 4-6 would no longer be available and requested channel pair 7 and 7' be retained.

ACMA response

The ACMA considers that using a reallocation or transition period, as applicable, of sufficient length, retention of channels 7 and 1'-7' (3830-4200 MHz), together with

⁹ Frequency of the channel raster are detailed in [RALI FX03](#)

appropriate changes to [RALI FX03](#) to allow more technical flexibility, is sufficient to accommodate USO based services and some other PTP services in a segment in areas reallocated for WA WBB. The ACMA will examine any changed coordination requirements for PTP services in the band as part of Technical Liaison Group (TLG) processes during implementation of the planning decisions. In order to have a single common technical framework for PTP Australia-wide the ACMA preliminary view is also that new PTP services should be restricted in the 3700–3800 MHz range in remote areas, but existing services allowed to continue ('grandfathered').

Unlicensed FSS earth stations

Unlicensed FSS earth stations in the 3700–4200 MHz band includes consumer TVRO and commercial TVRO use, as well as other unlicensed earth stations. SBS requested reconsideration to protect unlicensed FSS TVROs and to compensate any that required relocation. The ABC requested that its use of unlicensed earth stations be included in the public benefit analysis as it is flawed without its inclusion. Telstra supported the previous ACMA position that no case has been identified to protect unlicensed TVRO.

ACMA response

The ACMA has maintained a consistent position through relevant consultations that it will not provide support or protect unlicensed services (including TVRO services) nor take their potential use into account when determining planning outcomes.

Dynamic spectrum access

We note the feedback on the desired use of Dynamic Spectrum Access (DSA) techniques in the band for accommodating LA WBB services.

ACMA response

As per the options paper, the ACMA view is contained in the [New approaches to spectrum sharing - Next steps](#) paper, released in May 2020. The ACMA, then, reaffirms its views from the [3.6 GHz decisions and preliminary views](#) paper. It does not believe that DSA can offer practical sharing models that will provide the desired certainty of long-term access to current and new entrant LA WBB users of the band. The ACMA views the provision of a considerable amount of additional apparatus licensed, coordinated and protected spectrum (at least 200 MHz and in some areas 300 MHz) as offering a considered option for LA WBB interests.

Demand for WA WBB

We note the differing views on the demand for WA WBB services in the band and the view from Optus that any allocation should be tied to a defragmentation of spectrum for WA WBB across the wider 3400–4200 MHz range.

ACMA response

The ACMA restates its view from the options paper that it considers, at this point in time, that 100 MHz of contiguous spectrum for each WA WBB operator in the mid band spectrum (3-6 GHz) is a suitable target, and that a 100 MHz segment should desirably be identified for its use in metropolitan and regional areas in the 3700–4200 MHz to meet that target.

If, as per their submission, NBN Co would prefer spectrum in allocations for LA WBB and does not seek spectrum in a nominal 100 MHz WA WBB allocation, then more than 100 MHz per existing WA WBB operator across mid band frequencies may be available (following the same analysis as in the options paper).

The ACMA notes the desire to ensure spectrum for WA WBB is defragmented and may consider ways to do so as part of implementation of the outcomes in the band.

Demand for LA WBB

We note the differing views on the demand for LA WBB services in the band and that NBN Co consider themselves a LA WBB operator and prefer spectrum separated from WA WBB operators.

We note that WISPAU favours area wide licences for LA WBB if DSA is not proposed by the ACMA and the comments by ARCIA in relation to demand for LA WBB in all geographic areas.

ACMA response

We agree with the feedback stating that the preliminary preferred option 3 proposed to provide access for LA WBB services in remote areas where the ACMA identified no demand in the band. However, as the opportunity cost to incumbent services is small, i.e., existing incumbents will remain protected and first in time arrangements would provide equal access for incumbents and new LA WBB services, the effect of introducing LA WBB in remote areas on a shared basis is considered minimal. This will allow additional opportunities for the spectrum to be used resulting in greater overall spectrum utility.

FINAL DRAFT

ACMA planning decisions and preliminary views

Introduction

This section presents planning decisions made for the 3700-4200 MHz band. It also details preliminary views the ACMA has formed on the associated licensing and technical conditions that will subsequently be developed during implementation. We will conduct additional consultation processes on relevant licensing frameworks and instructions as required, in accordance with normal practice. Indicative timeframes for the subsequent work required to implement planning decisions are presented in the next steps section below.

In the options paper of July 2020, we assessed proposed replanning options against a set of desirable planning outcomes identified for the band.¹⁰ When assessing options, both qualitative and quantitative factors (through a cost-benefit analysis) were considered in an integrated manner. As a result of this analysis, option 3 was identified as most likely to maximise the public benefit from use of the 3700-4200 MHz band, and was therefore presented as the ACMA's preliminary preferred option.

When determining whether and how to progress re-planning activities further in the 3700–4200 MHz band, the ACMA considered a range of factors that align with consideration in the options paper:

- > recent developments and submissions on technological developments and international harmonisation.
- > recent developments and submissions on domestic considerations.
- > any change in relevant government policy that may affect the desirable planning outcomes in the band.
- > feedback on sharing, compatibility and other technical aspects received in submissions
- > revising the effect each option would have on incumbent services including feedback on potential costs
- > revising the assessment of each planning option against the desirable planning outcomes including the relative benefits and costs

Consideration of the issues can be found in *Discussion of submissions* and the analysis at Appendix B—Updated assessment of options.

After considering all relevant issues, the ACMA has decided to proceed with a variation of Option 3 from the options paper, with an upper limit for the introduction of WBB services of 4000 MHz, as illustrated in Figure 1.

In the ACMA's view, this option best satisfies the desirable planning outcomes, including being consistent with the object of the Act and with Government policy. It maximises overall public benefit by making more spectrum available for a range of uses that include WA WBB and LA WBB services.

¹⁰ The desirable planning outcomes are reproduced at Appendix A.

Planning decisions

The planning decisions detailed in below conclude the preliminary replanning stage of the review of the 3700–4200 MHz band and represent broad arrangements the ACMA considers will maximise the public benefit from the use of the band.

The ACMA proposes to implement a variation of the planning arrangements detailed under Option 3 (refer to Figure 1) with an upper limit on changes of 4000 MHz. This includes:

- > In metropolitan and regional areas in the 3700–3800 MHz range, clearing over time existing FSS and PTP services and introducing arrangements to allow for WA WBB services. The ACMA is of the preliminary view that spectrum licensing would be the preferred licensing mechanism for WA WBB uses and a five year re-allocation period for existing licensed FSS and PTP services is appropriate.
- > In remote areas in the 3700–3800 MHz range, introducing apparatus licensing arrangements to support LA WBB services on a shared basis with existing FSS and PTP services. New apparatus licensed FSS will be permitted on a coordinated, shared basis with licences for LA WBB services, but the ACMA's preliminary view that new PTP licences should not be issued in order to simplify new PTP technical arrangements in the band. Existing licensed PTP services would be allowed to continue (grandfathered). The ACMA will further investigate the most appropriate apparatus licence type to use to authorise LA WBB in this case.
- > Australia-wide, in the 3800–4000 MHz range, introducing arrangements to support LA WBB services on a shared basis with existing FSS and PTP services. New apparatus licences for FSS and PTP services will be issued on a coordinated, shared basis with LA WBB. The ACMA is of the preliminary view that area-wide apparatus licensing would be the preferred licensing mechanism for LA WBB uses in at least the metropolitan and regional areas.
- > Australia-wide, retaining the 4000–4200 MHz range for apparatus licensed FSS and PTP services only, and varying PTP arrangements if required to be consistent with this decision.
- > Maintaining existing arrangements for apparatus licensed radiolocation services and devices operating under class licences.
- > Maintaining ESPZs and arrangements under RALI MS44 during implementation of new arrangements¹¹. The ACMA does not propose these areas be identified for spectrum licensing or being permitted for apparatus licensing other than for FSS earth station receivers in the band.
- > Changing arrangements for unassigned scientific licences so they cannot be operated in areas and frequency segments proposed for spectrum licensing.

¹¹ The ACMA may review ESPZ arrangements, including assessing whether all of the eastern Australia ESPZs are still required in the band.

Figure 1: Planning arrangements for the 3700–4200 MHz band

FSS = fixed satellite service, PTP = point-to-point, WA WBB = wide area wireless broadband, LA WBB = local area wireless broadband

3700 MHz	3800 MHz	4000 MHz	
Metro and regional	Metro	Australia wide	Planned uses: WA WBB Access approach: Exclusive use Licence type: Spectrum licence Incumbent user licences: Cleared
	Regional		Planned uses: FSS, PTP, LA WBB Access approach: Shared, coordinated, first-in-time Licence type: apparatus licence type to be determined~ Incumbent user licences: Continued or opportunity to transition to AWL if applicable
	Remote	Remote	Planned uses: FSS, PTP Access approach: Shared, coordinated, first-in-time Licence type: sited based apparatus licence Incumbent user licences: Continued
			Planned uses: FSS, LA WBB, (PTP*) Access approach: Shared, coordinated, first-in-time Licence type: apparatus licence type to be determined~ Incumbent user licences: Continued
			Planned uses: FSS, PTP, LA WBB Access approach: Shared, coordinated, first-in-time Licence type: apparatus licence type to be determined~ Incumbent user licences: Continued

* preliminary view is that PTP should be restricted to existing services only in 3700–3800 MHz in remote areas to simplify the PTP technical framework.

~ preliminary view is that an area wide licensing framework may be appropriate for LA WBB in metropolitan and regional areas.

An indicative timeline for the ACMA’s implementation plan is provided at the ‘Next steps’ section. To give effect to the planning decisions outlined in this paper, the ACMA has developed the indicative high level implementation plan set out in Table 1.

The steps are described in broad terms to provide flexibility in implementing changes arising from the Bill. While the ACMA will manage and implement key aspects of this process, there are some elements that may still be dependent on decisions made by the Minister (for example, to designate spectrum for spectrum licensing, or make a re-allocation declaration).

Proposed planning decisions have not assumed any particular outcome in relation to the assessment of the utility and outcomes of spectrum in ‘urban excise areas’ in the 3.4 GHz band, as described in the [Optimising arrangements for the 3400-3575 MHz band Planning decisions and preliminary views](#) paper. Further consultation on that process is expected in Q1 2021. However, that process may affect how the planning decisions in the 3700–4200 MHz band are implemented. To maximise efficiency and spectrum outcomes it is hoped that any major allocation processes would be conducted simultaneously for both bands.

A full suite of licensing provisions and conditions that will apply, as well as details on any allocation processes have not yet been settled. These will be developed as part of subsequent consultation processes in accordance with normal practice.

Effect on incumbent licensees

The 3700–4200 MHz band is currently subject to a mix of apparatus and class licensing arrangements. These arrangements authorise a variety of services, including, FSS, fixed PTP links and radiolocation services¹² as well UWB and building material analysis devices authorised for operation under the *Radiocommunications (Low Interference Potential Devices) Class Licence 2015* (LIPD Class Licence). Scientific licences also authorise operation of devices in the 3700–4200 MHz band.

A key benefit of implementing Option 3 is that it balances the impact on incumbent services with the introduction of new WBB services. Existing class licensed arrangements would not be affected. Also, while a number of existing apparatus licensed services will be affected by the proposed new arrangements, the ACMA intends to propose final arrangements giving these services access to parts of the band in all parts of Australia and opportunities to access all but 100 MHz of the band in metropolitan and regional areas.

Preliminary views

The ACMA has formed the following preliminary views on a range of provisions and conditions that might apply to apparatus and spectrum licences for WBB services introduced into the band. Licence conditions will be developed as part of standard consultative processes in the development of the relevant regulatory tools, including legislative instruments. Consequently, the following are not definitive views of the ACMA and are subject to variation.

Appropriate licensing types and transition periods—preliminary views:

The ACMA is of the preliminary view that spectrum licensing would be the preferred licensing mechanism for WA WBB uses in the 3700-3800 MHz band in metropolitan and regional areas. A five year re-allocation period is currently proposed for affected apparatus licensed FSS and PTP services.

The ACMA will develop apparatus licensing arrangements for LA WBB in those parts of the 3700-4000 MHz band that will not be made available for WA WBB. The ACMA is of the preliminary view that area-wide apparatus licensing is likely to be the preferred licensing mechanism to introduce LA WBB uses in this case.

Spectrum licence conditions—preliminary views:

- > A technical framework will be developed through a proposed TLG process. As a starting point, the ACMA's preliminary view is to extend the existing arrangements in the adjacent 3400–3700 MHz spectrum licence band¹³ to cover the 3700-3800 MHz band. This includes the spectrum licence [core conditions](#), definition of [unacceptable interference](#) and [Radiocommunications Advisory Guidelines](#). Any other changes would be considered by a TLG as required.
- > The expiry of any spectrum licences issued should be aligned with those in the 3400–3700 MHz band.

Apparatus licence conditions—preliminary views:

- > Technical parameters for LA WBB use should align with those under the future spectrum licensing framework in the band as much as is practicable.
- > Any area wide licence framework proposed should ideally attempt to accommodate WBB, FSS and PTP services within the one framework if practicable.

¹³ Noting that these arrangements are also being reviewed under the 3.4 GHz TLG process discussed previously

- > Future consideration of low power or indoor deployment WBB arrangements is desirable.

Note, as stated in numerous RALIs developed by the ACMA, additional considerations apply to any proposal for an apparatus licence in the 3700–4200 MHz band that is within 150 km the GPOs of Darwin (NT) or Geraldton (WA). These RALIs state that any request for assignments within this zone must be referred to the ACMA for assessment. This policy will continue.

Managing demand—preliminary views:

Given the competing demands for WA and LA WBB uses in the band and the partial substitutability of AWL for spectrum licensing, the ACMA may examine using different allocation methods to manage expected high demand in areas such as metro (and) regional areas. Methods could include, but are not limited to, a price based allocation or competition limits. The ACMA intends to consult on allocation issues before releasing spectrum.

Effect on incumbent licensees – preliminary views

Preliminary views on the incumbent service types in the band are outlined below.

Fixed PTP licences

Existing arrangements for PTP licensing in the 3700–4200 MHz band will be affected by the ACMA's planning decisions. Specifically, the preliminary view is that arrangements will be consolidated in the 3800–4200 MHz frequency range Australia wide.

If, as per the preliminary views, there is a reallocation of 3700-3800 MHz for spectrum licensing in metro and regional areas with a five year reallocation period, then under 153H of the Act, any incumbent PTP services in metro and regional areas remaining at the end of the reallocation period would be cancelled. We will put in policies as required to support the transition/clearance of incumbent PTP services during the reallocation period.

If, as per the preliminary views, it is better to manage a single PTP service technical framework, in remote areas in 3700-3800 MHz the ACMA will adopt policies to not issue new licences. Existing licensed services in remote areas in 3700-3800 MHz will be permitted to remain, be afforded ongoing protection and allowed to be re-issued (ie grandfathered).

Because the new PTP arrangements may be best served using different technical channel arrangements than that which exists under RALI FX3 today, the ACMA will consider whether there is benefit in revising the technical and channel arrangements in the 3.8 GHz band. The ACMA would consult with stakeholders on any proposed changes.

The new planning arrangements will result in the following amount of spectrum being available for future PTP licensing:

- > 200 MHz Australia wide, in the 3800-4000 MHz band, shared with FSS and LA WBB.
- > 200 MHz Australia wide, in the 4000-4200 MHz band, shared with FSS only.

To achieve the intended outcome affected services in the 3700–3800 MHz range in metro and regional areas will need to do one of the following:

- > retune services into the 3800–4200 MHz frequency range
- > relocate to another frequency band in areas where suitable alternative spectrum options exist or

- > cease operating in the band.

Fixed satellite service (FSS) and ESPZs

The ACMA has established an ESPZ near Mingenew in Western Australia. It has also established several ESPZs in eastern Australia while it investigates their viability for long term use by FSS services. The frequencies and areas covered by these ESPZs are defined in RALI MS44 and were discussed in the Options paper. The frequencies include the 3700–4200 MHz band in each ESPZ.

It is the ACMA's view, at this stage, that these ESPZ areas should not be identified for any spectrum licensing or apparatus licensing in the band other than for FSS receivers. The ACMA may consider, during the TLG process, whether it is appropriate to review the use of the band in each ESPZ and potentially remove the band from the ESPZ at some future point, if the band is not being utilised at the ESPZ. The intent would be to retain one or two ESPZ for the band in eastern Australia.

Outside of the ESPZs, existing arrangements for FSS licensing in the 3700–4200 MHz band in regional areas will be affected by the ACMA's planning decisions. Specifically, the arrangements will be consolidated in the 3800–4200 MHz frequency range in metropolitan and regional areas.

If, as per the preliminary views, there is a reallocation of 3700-3800 MHz band to spectrum licencing in metro and regional areas with a five year reallocation period, then under 153H of the Act any incumbent FSS services in metro and regional areas remaining at the end of the reallocation period would be cancelled. We will put in policies as required to support the transition/clearance of incumbent FSS services during the reallocation period.

The new planning arrangements will result in the following amount of spectrum being available for FSS licensing in the 3700–4200 MHz band:

- > 200 MHz Australia-wide, in the 3800-4000 MHz band, shared with LA WBB and PTP services.
- > 200 MHz Australia-wide, in the 4000-4200 MHz band, shared with PTP services, using apparatus licences allocated under a first in time arrangement.
- > 100 MHz, in the 3700-3800 MHz band, in remote areas shared with LA WBB and incumbent PTP services.

To achieve the intended outcome affected services in the 3700–3800 MHz range in metro and regional areas will need to do one of the following:

- > retune services into the 3800–4200 MHz frequency range
- > relocate to another frequency band in areas where suitable alternative spectrum options exist or
- > cease operating.

Radiolocation services

Radiolocation services will continue to operate in the band under existing arrangements.

Devices operating under class licences

The LIPD Class Licence sets arrangements for the following devices to operate across the 3700–4200 MHz band:

- > building material analysis transmitters and ground penetrating radars operating in the 30-12400 MHz range
- > UWB transmitters operating in the 3100–4800 MHz band.

Operation of devices under the LIPD Class Licence is on a 'no interference and no protection' basis with other licensed services. The use of UWB ground and wall penetrating radar devices make the identification and resolution of interference more difficult than registered apparatus licensed devices. These concerns can be applied generally to all class licensed devices and the ACMA considers the low power nature of these services greatly reduces the risk of interference. Consequently, the ACMA does not see a case to change the licensing arrangements for these specific devices.

Scientific apparatus licences

Services operating under scientific apparatus licences, both assigned and non-assigned, are permitted to be licensed in the 3700–4200 MHz band with conditions as per the [Radiocommunications Licence Conditions \(Scientific Licence\) Determination 2015](#) ('Scientific LCD'). These licences operate on a 'no interference and no protection' basis. Both assigned (the location (site or area) of the service and the frequency of operation are recorded on the licence) and non-assigned (the location and exact frequencies of operation are not recorded on the licence) licences may be issued. For non-assigned scientific apparatus licences, operation is usually confined to a shielded room. This type of licence permits generic use of the entire radiofrequency band, though typically licensees only operate in specific bands of interest.

The ACMA intends to support the ongoing issue and operation of scientific licences in the 3700–4200 MHz band as far as is practicable. When spectrum is re-allocated for the issue of spectrum licences, section 153H of the Act requires that any incumbent apparatus licences, including scientific licences, within the affected spectrum space be cancelled at the end of the defined re-allocation period. The issue of new apparatus licences once spectrum has been re-allocated and beyond the re-allocation period is restricted as per section 153P of the Act. This limits the issue of licences to bodies covered under paragraphs 27(1)(b) to (be) of the Act and when the ACMA is satisfied special circumstances apply. The ACMA would continue to consider requests for such licences on a case-by-case basis.

In the event any areas and frequencies are subject to a reallocation declaration, the ACMA is still considering options for how best to manage scientific non-assigned licences. This could include a variation to the Scientific LCD or the application of a special condition to relevant licences to prevent operation within the affected frequency ranges.

Next steps

To give effect to the planning decisions outlined in this paper, the ACMA has developed the indicative high level implementation plan set out in Table 1. The steps are described in broad terms to provide flexibility to address any changes that may arise from amendments to the Act, as proposed by the Bill.

The table shows the activities and estimated timing of each process that will follow the release of this paper. Completion of these activities is dependent on a variety of factors including feedback received from stakeholders and consideration by the ACMA Authority. Timeframes are indicative only at this stage and represent the earliest that we expect to commence the activities listed. Work on each stage continues until the next stage commences. The implementation program will be developed in and consulted on in greater detail as appropriate and updated through the annual ACMA [Five-year spectrum outlook](#) (FYSO) process.

Through the FYSO, the ACMA has an ongoing process to assess the effectiveness of the Australian spectrum management framework. We will monitor the implementation and ongoing use in the band and respond to changing uses or demand as part of our continuous planning process outlined in the yearly FYSO updates. This will include scanning the environment both domestically and internationally.

In assessing specifically whether the proposed new arrangements for the 3700-4200 MHz band have been successfully implemented, the ACMA will consider whether:

- > suitable arrangements for PTP are in place,
- > suitable arrangements for apparatus licensed LA WBB have been established and what the take up of licences, and
- > there has been a successful allocation of licences for WA WBB use in the relevant areas of the 3700-3800 MHz band.

Table 1: Indicative timetable for implementation of planning arrangements in the 3700–4200 MHz band.

Action	Timeframe
Review/implement embargo arrangements to reflect planning decisions.	Q1 2021
Review RALI FX3 3.8 GHz PTP arrangements as required to reflect planning decisions.	Q1-Q4 ¹⁴ 2021
Development of the apparatus licensing framework for LA WBB in remote areas across 3700-4000 MHz. ¹⁵ including: <ul style="list-style-type: none"> • technical frameworks • licensing frameworks • pricing arrangements 	Q2-Q4 2021 Spectrum availability after 2021

¹⁴ RALI outcomes dependent on the following technical framework developments

¹⁵ The ACMA notes that the development of the apparatus licensing framework for LA WBB in remote areas in 3700-4000 MHz can be aligned with the development of the framework for LA WBB for remote areas in 3400-3700 MHz that the ACMA has already made planning decisions on.

Action	Timeframe
<p>Development of the apparatus licensing framework for LA WBB in areas with low expected contention in regional areas in 3800-4000 MHz.¹⁶ including:</p> <ul style="list-style-type: none"> • technical frameworks • licensing frameworks • pricing arrangements 	<p>Q3 2021-Q1 2022</p> <p>Spectrum availability after Q1 2022</p>
<p>Development of the apparatus licensing framework for LA WBB in areas with expected contention such as metropolitan and more populated regional centres regional in 3800-4000 MHz including:</p> <ul style="list-style-type: none"> • technical frameworks • licensing frameworks • allocation and pricing arrangements 	<p>Q3 2021-Q2 2022</p> <p>Spectrum availability after Q2 2022</p>
<p>Commence development of a framework for the allocation of spectrum licences in 3700-3800 MHz in defined metropolitan and regional areas.¹³</p>	<p>Q3 2021</p>
<p>Commence TLG to develop the spectrum licence technical framework for the 3700-3800 MHz band in defined metropolitan and regional areas.¹⁷</p>	<p>Q4 2021</p>
<p>Allocation of spectrum licences in the 3700-3800 MHz in metropolitan and regional areas.</p>	<p>to be determined.</p>

¹⁶ The ACMA notes that the development of the apparatus licensing framework for LA WBB in regional areas in 3700-4000 MHz can be aligned with the development of the framework for LA WBB for regional areas in 3400-3700 MHz that the ACMA has already made planning decisions on.

¹⁷ The ACMA notes the likely desirability to allocate spectrum licences in in 3700-3800 MHz in defined metro and regional areas simultaneously with the allocations of any spectrum licences likely to be made available as a result of the ACMA's work program in the 3.4 GHz band in regional areas.

Appendix A—Desirable planning outcomes

The desirable planning outcomes for the review of the 3700–4200 MHz band are replicated from the options paper and include linkage to the legislative and policy environment identified:

1. Introduce WA WBB and LA WBB uses with frameworks suitable for both. Doing so is consistent with the legislative and policy framework work by:
 - > Maximising the overall public benefit from using the spectrum (paragraph 3(a) of the Act).
 - > Provide a responsive and flexible approach to meeting the needs of spectrum users (paragraph 3(c) of the Act).
 - > Encourage the use of efficient radiocommunications technologies so that a wide range of services of adequate quality can be provided (paragraph 3(d) of the Act).
 - > Support the communications policy objectives of the Commonwealth Government (paragraph 3(f) of the Act) by making spectrum for 5G available in a timely manner (5G–Enabling the future economy strategy).
2. Support a range of continuing uses in the band, in particular:
 - A. Ongoing coordinated FSS use in some form and maintain the existing policy of not supporting or protecting unlicensed FSS earth stations. The ACMA will consider the specific circumstances of, and where possible mitigate the impact on, individual incumbent licensed FSS users. Doing so is consistent with the legislative and policy framework by:
 - a) Maximising the overall public benefit from using the spectrum (paragraph 3(a) of the Act).
 - b) Provide a responsive and flexible approach to meeting the needs of spectrum users (paragraph 3(c) of the Act).
 - c) Encourage the use of efficient radiocommunications technologies so that a wide range of services of adequate quality can be provided (paragraph 3(d) of the Act).
 - B. PTP use in some form. The ACMA will consider the specific circumstances of, and where possible mitigate the impact on, individual incumbent licensed PTP services, especially those involved in the delivery of USO services. Doing so is consistent with the legislative and policy framework by:
 - a) Maximising the overall public benefit from using the spectrum (paragraph 3(a) of the Act).
 - b) Provide a responsive and flexible approach to meeting the needs of spectrum users (paragraph 3(c) of the Act).
 - c) Encourage the use of efficient radiocommunications technologies so that a wide range of services of adequate quality can be provided (paragraph 3(d) of the Act).
 - d) Support the communications policy objectives of the Commonwealth Government (paragraph 3(f) of the Act) by supporting USO services.

- C. Radiodetermination services operated by the Department of Defence. Doing so is consistent with the legislative and policy framework by making adequate provision of the spectrum for use by agencies involved in the defence or national security of Australia, law enforcement or the provision of emergency services (subparagraph 3(b)(i) of the Act).
 - D. ESPZs, as detailed in RALI MS44, to ensure there are long term options for FSS in the entire 3700–4200 MHz band. Doing so is consistent with the legislative and policy framework by:
 - a) Maximising the overall public benefit from using the spectrum (paragraph 3(a) of the Act).
 - b) Providing a responsive and flexible approach to meeting the needs of spectrum users (paragraph 3(c) of the Act).
 - c) Encouraging the use of efficient radiocommunications technologies so that a wide range of services of adequate quality can be provided (paragraph 3(d) of the Act).
 - E. Class licence arrangements for building material analysis/ground penetrating radar and UWB devices. Doing so is consistent with the legislative and policy framework by:
 - a) Maximising the overall public benefit from using the spectrum (paragraph 3(a) of the Act).
 - b) Providing a responsive and flexible approach to meeting the needs of spectrum users (paragraph 3(c) of the Act).
 - c) Encouraging the use of efficient radiocommunications technologies so that a wide range of services of adequate quality can be provided (paragraph 3(d) of the Act).
3. Ensure coexistence with adjacent band services is addressed. This includes radio altimeters operating above 4200 MHz, and existing spectrum and apparatus licensed services below 3700 MHz. Doing so is consistent with the legislative and policy framework by:
- > Maximising the overall public benefit from using the spectrum (paragraph 3(a) of the Act).
 - > Providing a responsive and flexible approach to meeting the needs of spectrum users (paragraph 3(c) of the Act).
 - > Encouraging the use of efficient radiocommunications technologies so that a wide range of services of adequate quality can be provided (paragraph 3(d) of the Act).

Appendix B—Updated assessment of options

This section considers new information received from submissions to the options paper and other relevant sources. It considers whether the assessment of options from the options paper is still accurate and confirms the preferred option.

Updates to domestic use of the band

Simultaneously with the release of the options paper, Embargo 78 was introduced to be able to carefully consider new license applications in the 3700–4000 MHz range in order to preserve planning options. Applicants for licences were still able to request exemptions from the Embargo and these were considered on a case-by-case basis. Figures 2 and 3 give an overview of the geographical distribution of device registrations in the band as of 1 October 2020.

Figure 2 - PTP device registrations as of 1 October 2020

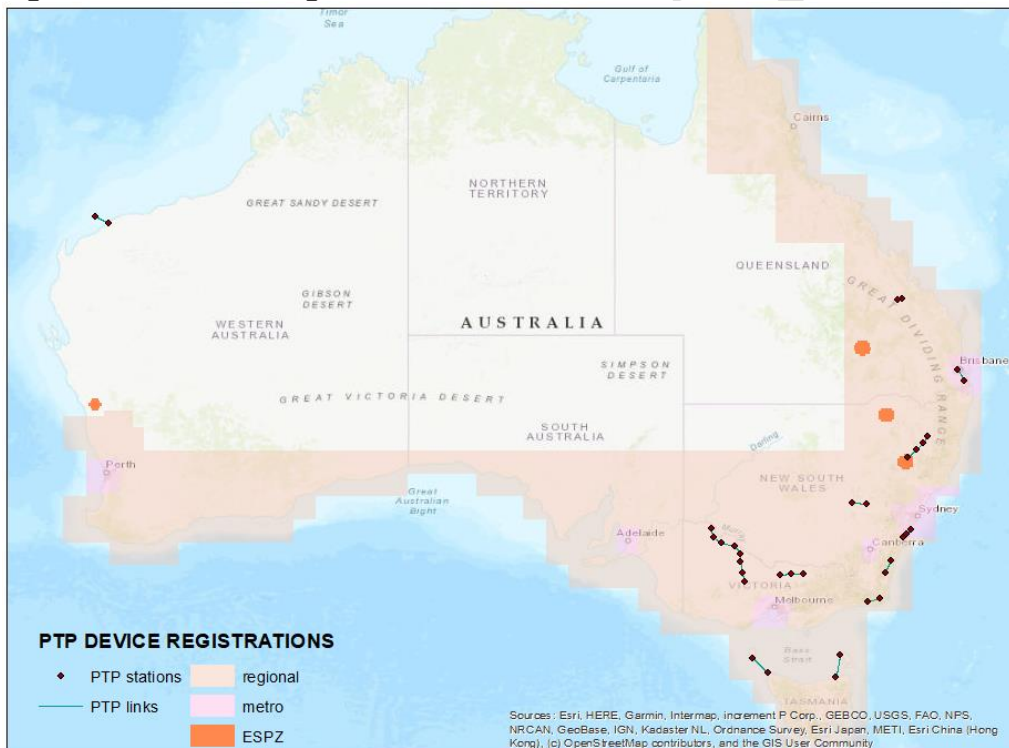
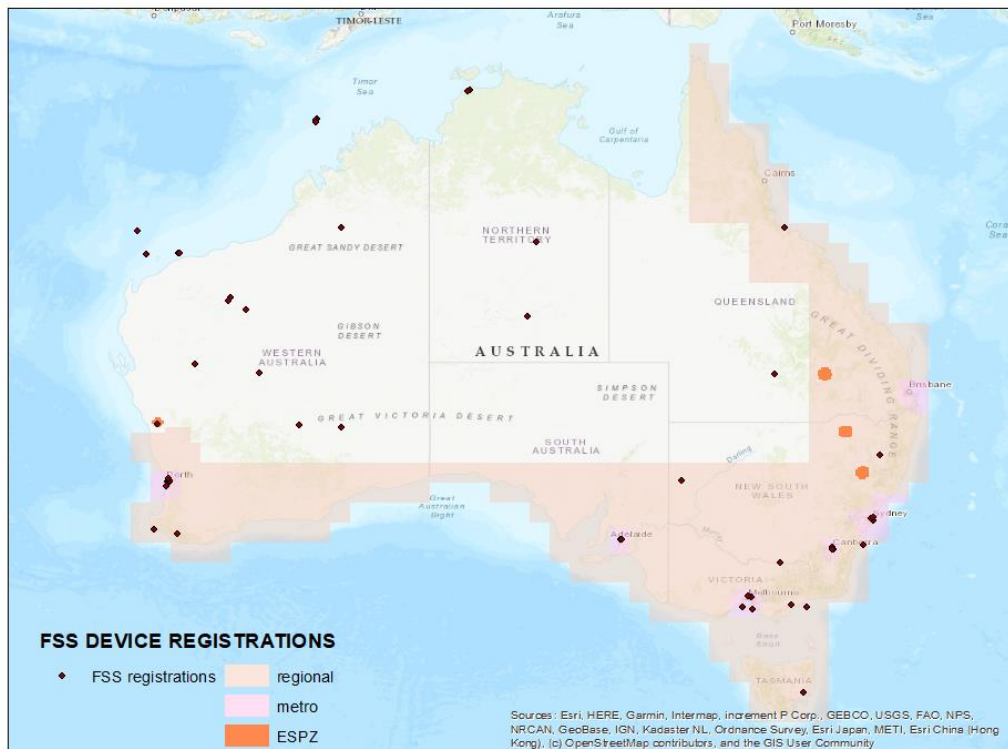


Figure 3 - FSS device registrations as of 1 October 2020



Some exemptions to Embargo 78 for FSS earth station licences have been granted but will not result in significantly more spectrum denial to potential new WBB services than existed before the introduction of Embargo 78. Consequently, the figures used in the Cost Benefit Analysis (CBA) that supported the assessment of options in the options paper are still valid.

Updates to government policy

The government [response](#) to the [Next Gen Future: Inquiry into the deployment, adoption and application of 5G in Australia](#) was tabled in parliament on 12 November 2020. Amongst supported recommendations, the government supported recommendation 1:

- > Spectrum allocation being finalised expeditiously and that the Australian Communications and Media Authority, in conjunction with the Department of Communications and Australian Competition and Consumer Commission, investigate how future spectrum auctions can promote improved market competition for the benefit of consumers.

Updates to international developments

The Department of Innovation, Science and Economic Development Canada (ISED) released a [consultation](#) on the 3650–4200 MHz band in August 2020. In summary it sought feedback to proposing to reallocate the 3700–3980 MHz frequency range for WBB applications but also considered allowing licensed FSS operations to continue in defined satellite-dependent areas.

The Federal Communications Commission (FCC) in the USA [auctioned](#) spectrum in the range 3700–3980 MHz to introduce 5G services in the band.

Conclusions from new evidence affecting assessment methodology and the assessment

While noting comments on the assessment methodology, including that on the cost benefit analysis, the ACMA considers that:

- > The existing assessment methodology, including the cost benefit analysis, represents a considered approach that includes both qualitative and quantitative factors to determine which option best satisfies the desirable planning outcomes in the band and maximises the public benefit from the allocation and use of spectrum. Changing the assessment methodology during the consultation process will not allow a consistent evaluation of the evidence across the whole process.
- > Due to Embargo 78, there has not been a significant change to incumbent use of the band since the release of the options paper.
- > The assessment has consistently considered impacts on licenced services and excluded unlicensed services in its assessment.
- > Feedback on FSS relocation and retuning costs have been limited but suggests FSS displacement costs could be lower than the assessment in the options paper. This would reduce displacement costs for both options 1 and 3 which may then indicate that option 1 is net most beneficial under the CBA rather than option 3. However, there is significant uncertainty in the economic value of increasing the amount of spectrum exclusively allocated to WA WBB services and option 1 provides no access for LA WBB in expected high demand areas such as metro and regional areas.
- > Feedback on the future of PTP services as discussed was limited to one stakeholder, which was addressed earlier in this paper.

Consequently, the ACMA considers that the conclusion of the assessment of options from the options paper is still valid, and that Option 3 still represents the highest public benefit in the band.

A suitable value for the breakpoints in option 3 then depend on:

- > Demand for WA WBB services which were discussed at the *Demand for WA WBB* section and concluded that a 100 MHz allocation in metropolitan and regional areas is sufficient at this point in time.
- > A view on compatibility of WBB services with adjacent band radio altimeters, which were discussed at the *Wireless Avionics Intra-Communication (WAIC)/radio altimeters* section and concluded that a 200 MHz guard band is sufficient to manage compatibility.

Appendix C—Geographical area definitions

The ACMA has defined geographical areas ¹⁸to assist in the analysis of use of, and potential future use scenarios for, the 3700–4200 MHz band. A brief description of each follows:

- > Metropolitan—covers all capital cities (except Darwin and Hobart). It mirrors the metropolitan areas defined in the [Radiocommunications \(Spectrum Re-allocation—3.6 GHz Band for Adelaide and Eastern Metropolitan Australia\) Declaration 2018](#) and the [Radiocommunications \(Spectrum Re-allocation—3.6 GHz Band for Perth\) Declaration 2018](#).
- > Regional—mirrors the regional areas subject to spectrum licensing in the 3.6 GHz band as defined in the [Radiocommunications \(Spectrum Re-allocation—3.6 GHz Band for Regional Areas\) Declaration 2018](#).
- > Remote—includes those areas of Australia not covered by metropolitan and Regional areas.
- > Australia-wide—covers all of Australia but excludes Australian external territories.

The Australian Spectrum Map Grid (ASMG) is used to define geographical areas over which spectrum licences are issued. The Hierarchical Cell Identification Scheme (HCIS) is a naming convention developed by the ACMA that applies unique ‘names’ to each of the cells that make up the ASMG. The ASMG and HCIS are described in detail in the document [The Australian spectrum map grid 2012](#).

The HCIS coordinates in Table 2: HCIS description of areas below can be converted into a Placemark file (viewable in Google Earth) through a facility on the [ACMA website](#).

¹⁸ These definitions do not include any areas of appropriate exclusion from licensing such as the ESPZs or the mid west radio quiet zone ([RQZ](#)), among others

Figure 4:3700–4200 MHz band geographical area descriptions

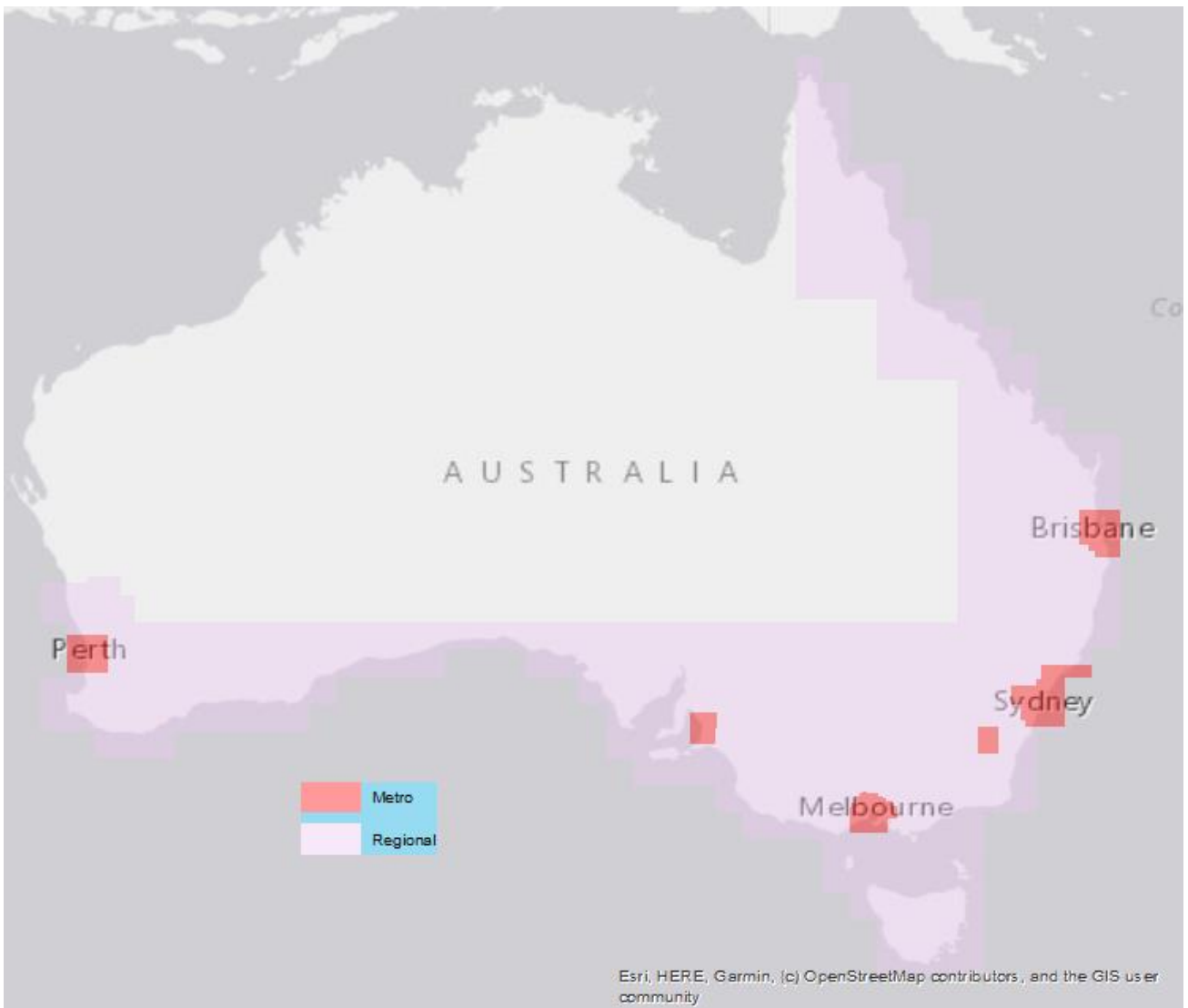


Table 2: HCIS description of areas

Area	Sub-area name	HCIS
Metropolitan	Adelaide	IW3J,IW3K,IW3L,IW3N,IW3O,IW3P,IW6B,IW6C,IW6D,IW6F,IW6G,IW6H,IW3E5,IW3E6,IW3E8,IW3E9,IW3F4,IW3F5,IW3F6,IW3F7,IW3F8,IW3F9,IW3G4,IW3G5,IW3G6,IW3G7,IW3G8,IW3G9,IW3H4,IW3H5,IW3H6,IW3H7,IW3H8,IW3H9,IW3I2,IW3I3,IW3I5,IW3I6,IW3I8,IW3I9,IW3M2,IW3M3,IW3M5,IW3M6,IW3M8,IW3M9,IW6A2,IW6A3,IW6A5,IW6A6,IW6A8,IW6A9,IW6E2,IW6E3,IW6E5,IW6E6,IW6E8,IW6E9,JW1E4,JW1E7,JW1I1,JW1I4,JW1I7,JW1M1,JW1M4
	Brisbane	NT9,NT8C,NT8D,NT8G,NT8H,NT8K,NT8L,NT8O,NT8P,NU3A,NU3B,NU3C,NU3D,NU3F,NU3G,NU3H,NT5O4,NT5O5,NT5O6,NT5O7,NT5O8,NT5O9,NT5P4,NT5P5,NT5P6,NT5P7,NT5P8,NT5P9,NT6M4,NT6M5,NT6M6,NT6M7,NT6M8,NT6M9,NT6N4,NT6N5,NT6N6,NT6N7,NT6N8,NT6N9,NT6O4,NT6O5,NT6O6,NT6O7,NT6O8,NT6O9,NT6P4,NT6P5,NT6P6,NT6P7,NT6P8,NT6P9,NU2C1,NU2C2,NU2C3,NU2D1,NU2D2,NU2D3,NU2D5,NU2D6,NU2D8,NU2D9,NU2H2,NU2H3,NU3E1,NU3E2,NU3E3,NU3E5,NU3E6,NU3E8,NU3E9,NU3I2,NU3I3,NU3J1,NU3J2,NU3J3,NU3K1,NU3K2,NU3K3,NU3L1,NU3L2,NU3L3
	Canberra	MW4D,MW4H,MW4L,MW5A,MW5B,MW5E,MW5F,MW5I,MW5J,MW1P4,MW1P5,MW1P6,MW1P7,MW1P8,MW1P9,MW2M4,MW2M5,MW2M6,MW2M7,MW2M8,MW2M9,MW2N4,MW2N5,MW2N6,MW2N7,MW2N8,MW2N9,MW4P1,MW4P2,MW4P3,MW5M1,MW5M2,MW5M3,MW5N1,MW5N2,MW5N3
	Melbourne	KX3J,KX3K,KX3L,KX3N,KX3O,KX3P,KX6A,KX6B,KX6C,KX6D,KX6E,KX6F,KX6G,KX6H,KX6I,KX6J,KX6K,KX6L,LX1I,LX1M,LX1N,LX1O,LX4A,LX4B,LX4C,LX4E,LX4I,KX3E9,KX3F5,KX3F6,KX3F7,KX3F8,KX3F9,KX3G1,KX3G2,KX3G4,KX3G5,KX3G6,KX3G7,KX3G8,KX3G9,KX3H4,KX3H5,KX3H6,KX3H7,KX3H8,KX3H9,KX3I3,KX3I6,KX3I8,KX3I9,KX3M2,KX3M3,KX3M4,KX3M5,KX3M6,KX3M7,KX3M8,KX3M9,LX1E4,LX1E7,LX1E8,LX1E9,LX1J1,LX1J4,LX1J5,LX1J6,LX1J7,LX1J8,LX1J9,LX1K4,LX1K7,LX4F1,LX4F2,LX4F4,LX4F5,LX4F7,LX4F8,LX4J1,LX4J2,LX4J4,LX4J5,LX4J7,LX4J8
	Perth	BV1I,BV1J,BV1K,BV1L,BV1M,BV1N,BV1O,BV1P,BV2I,BV2J,BV2M,BV2N,BV4A,BV4B,BV4C,BV4D,BV4E,BV4F,BV4G,BV4H,BV4I,BV4J,BV4K,BV4L,BV5A,BV5B,BV5E,BV5F,BV5I,BV5J,BV1E7,BV1E8,BV1E9,BV1F7,BV1F8,BV1F9,BV1G7,BV1G8,BV1G9,BV1H7,BV1H8,BV1H9,BV2E7,BV2E8,BV2E9,BV2F7,BV2F8,BV2F9,BV4M1,BV4M2,BV4M3,BV4N1,BV4N2,BV4N3,BV4O1,BV4O2,BV4O3,BV4P1,BV4P2,BV4P3,BV5M1,BV5M2,BV5M3,BV5N1,BV5N2,BV5N3
	Sydney	MV9I,MV9J,MV9K,MV9L,MV9M,MV9N,MV9O,MV9P,MW3C,MW3D,MW3G,MW3H,MW3K,MW3L,NV4N,NV4O,NV4P,NV5M,NV5N,NV5O,NV5P,NV7B,NV7C,NV7D,NV7E,NV7F,NV7G,NV7H,NV7I,NV7J,NV7K,NV7L,NV7M,NV7N,NV7O,NV7P,NW1A,NW1B,NW1C,NW1D,NW1E,NW1F,NW1G,NW1H,NW1I,NW1J,NW1K,NW1L,MV9D6,MV9D9,MV9E4,MV9E5,MV9E6,MV9E7,MV9E8,MV9E9,MV9F4,MV9F5,MV9F6,MV9F7,MV9F8,MV9F9,MV9G4,MV9G5,MV9G6,MV9G7,MV9G8,MV9G9,MV9H3,MV9H4,MV9H5,MV9H6,MV9H7,MV9H8,MV9H9,MW3B2,MW3B3,MW3B5,MW3B6,MW3B8,MW3B9,MW3F2,MW3F3,MW3F5,MW3F6,MW3F8,MW3F9,MW3J2,MW3J3,MW3O1,MW3O2,MW3O3,MW3P1,MW3P2,MW3P3,NV4I5,NV4I6,NV4I8,NV4I9,NV4J4,NV4J5,NV4J6,NV4J7,NV4J8,NV4J9,NV4K4,NV4K5,NV4K6,NV4K7,NV4K8,NV4K9,NV4L4,NV4L5,NV4L6,NV4L7,NV4L8,NV4L9,NV4M2,NV4M3,NV4M5,NV4M6,NV4M8,NV4M9,NV5I4,NV5I5,NV5I6,NV5I7,NV5I8,NV5I9,NV5J4,NV5J5,NV5J6,NV5J7,NV5J8,NV5J9,NV5K4,NV5K5,NV5K6,NV5K7,NV5K8,NV5K9,NV5L4,NV5L5,NV5L6,NV5L7,NV5L8,NV5L9,NV7A2,NV7A3,NV7A4,NV7A5,NV7A6,NV7A7,NV7A8,NV7A9,NW1M1,NW1M2,NW1

Area	Sub-area name	HCIS
		M3,NW1N1,NW1N2,NW1N3,NW1O1,NW1O2,NW1O3,NW1P1,NW1P2,NW1P3
Regional	-	CV,DV,IV,JV,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,JW2,JW3,JW4,JW5,JW6,JW7,JW8,JW9,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,MW6,MW7,MW8,MW9,MX1,MX2,MX3,MX4,MX7,MY1,MY4,MY7,MZ1,NS4,NS7,NS8,NS9,NT1,NT2,NT3,NT4,NT7,NU1,NU4,NU5,NU6,NU7,NU8,NU9,NV1,NV2,NV3,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,BV1A,BV1B,BV1C,BV1D,BV2A,BV2B,BV2C,BV2D,BV2G,BV2H,BV2K,BV2L,BV2O,BV2P,BV5C,BV5D,BV5G,BV5H,BV5K,BV5L,BV5O,BV5P,IW3A,IW3B,IW3C,IW3D,IW6I,IW6J,IW6K,IW6L,IW6M,IW6N,IW6O,IW6P,JW1A,JW1B,JW1C,JW1D,JW1F,JW1G,JW1H,JW1J,JW1K,JW1L,JW1N,JW1O,JW1P,KX3A,KX3B,KX3C,KX3D,KX6M,KX6N,KX6O,KX6P,LX1A,LX1B,LX1C,LX1D,LX1F,LX1G,LX1H,LX1L,LX1P,LX4D,LX4G,LX4H,LX4K,LX4L,LX4M,LX4N,LX4O,LX4P,MV9A,MV9B,MV9C,MW1A,MW1B,MW1C,MW1D,MW1E,MW1F,MW1G,MW1H,MW1I,MW1J,MW1K,MW1L,MW1M,MW1N,MW1O,MW2A,MW2B,MW2C,MW2D,MW2E,MW2F,MW2G,MW2H,MW2I,MW2J,MW2K,MW2L,MW2O,MW2P,MW3A,MW3E,MW3I,MW3M,MW3N,MW4A,MW4B,MW4C,MW4E,MW4F,MW4G,MW4I,MW4J,MW4K,MW4M,MW4N,MW4O,MW5C,MW5D,MW5G,MW5H,MW5K,MW5L,MW5O,MW5P,NT5A,NT5B,NT5C,NT5D,NT5E,NT5F,NT5G,NT5H,NT5I,NT5J,NT5K,NT5L,NT5M,NT5N,NT6A,NT6B,NT6C,NT6D,NT6E,NT6F,NT6G,NT6H,NT6I,NT6J,NT6K,NT6L,NT8A,NT8B,NT8E,NT8F,NT8I,NT8J,NT8M,NT8N,NU2A,NU2B,NU2E,NU2F,NU2G,NU2I,NU2J,NU2K,NU2L,NU2M,NU2N,NU2O,NU2P,NU3M,NU3N,NU3O,NU3P,NV4A,NV4B,NV4C,NV4D,NV4E,NV4F,NV4G,NV4H,NV5A,NV5B,NV5C,NV5D,NV5E,NV5F,NV5G,NV5H,BV1E1,BV1E2,BV1E3,BV1E4,BV1E5,BV1E6,BV1F1,BV1F2,BV1F3,BV1F4,BV1F5,BV1F6,BV1G1,BV1G2,BV1G3,BV1G4,BV1G5,BV1G6,BV1H1,BV1H2,BV1H3,BV1H4,BV1H5,BV1H6,BV2E1,BV2E2,BV2E3,BV2E4,BV2E5,BV2E6,BV2F1,BV2F2,BV2F3,BV2F4,BV2F5,BV2F6,BV4M4,BV4M5,BV4M6,BV4M7,BV4M8,BV4M9,BV4N4,BV4N5,BV4N6,BV4N7,BV4N8,BV4N9,BV4O4,BV4O5,BV4O6,BV4O7,BV4O8,BV4O9,BV4P4,BV4P5,BV4P6,BV4P7,BV4P8,BV4P9,BV5M4,BV5M5,BV5M6,BV5M7,BV5M8,BV5M9,BV5N4,BV5N5,BV5N6,BV5N7,BV5N8,BV5N9,IW3E1,IW3E2,IW3E3,IW3E4,IW3E7,IW3F1,IW3F2,IW3F3,IW3G1,IW3G2,IW3G3,IW3H1,IW3H2,IW3H3,IW3I1,IW3I4,IW3I7,IW3M1,IW3M4,IW3M7,IW6A1,IW6A4,IW6A7,IW6E1,IW6E4,IW6E7,JW1E1,JW1E2,JW1E3,JW1E5,JW1E6,JW1E8,JW1E9,JW1I2,JW1I3,JW1I5,JW1I6,JW1I8,JW1I9,JW1M2,JW1M3,JW1M5,JW1M6,JW1M7,JW1M8,JW1M9,KX3E1,KX3E2,KX3E3,KX3E4,KX3E5,KX3E6,KX3E7,KX3E8,KX3F1,KX3F2,KX3F3,KX3F4,KX3G3,KX3H1,KX3H2,KX3H3,KX3I1,KX3I2,KX3I4,KX3I5,KX3I7,KX3M1,LX1E1,LX1E2,LX1E3,LX1E5,LX1E6,LX1J2,LX1J3,LX1K1,LX1K2,LX1K3,LX1K5,LX1K6,LX1K8,LX1K9,LX4F3,LX4F6,LX4F9,LX4J3,LX4J6,LX4J9,MV9D1,MV9D2,MV9D3,MV9D4,MV9D5,MV9D7,MV9D8,MV9E1,MV9E2,MV9E3,MV9F1,MV9F2,MV9F3,MV9G1,MV9G2,MV9G3,MV9H1,MV9H2,MW1P1,MW1P2,MW1P3,MW2M1,MW2M2,MW2M3,MW2N1,MW2N2,MW2N3,MW3B1,MW3B4,MW3B7,MW3F1,MW3F4,MW3F7,MW3J1,MW3J4,MW3J5,MW3J6,MW3J7,MW3J8,MW3J9,MW3O4,MW3O5,MW3O6,MW3O7,MW3O8,MW3O9,MW3P4,MW3P5,MW3P6,MW3P7,MW3P

Area	Sub-area name	HCIS
		<p>8,MW3P9,MW4P4,MW4P5,MW4P6,MW4P7,MW4P8,MW4P9,MW5M4,MW5M5,MW5M6,MW5M7,MW5M8,MW5M9,MW5N4,MW5N5,MW5N6,MW5N7,MW5N8,MW5N9,NT5O1,NT5O2,NT5O3,NT5P1,NT5P2,NT5P3,NT6M1,NT6M2,NT6M3,NT6N1,NT6N2,NT6N3,NT6O1,NT6O2,NT6O3,NT6P1,NT6P2,NT6P3,NU2C4,NU2C5,NU2C6,NU2C7,NU2C8,NU2C9,NU2D4,NU2D7,NU2H1,NU2H4,NU2H5,NU2H6,NU2H7,NU2H8,NU2H9,NU3E4,NU3E7,NU3I1,NU3I4,NU3I5,NU3I6,NU3I7,NU3I8,NU3I9,NU3J4,NU3J5,NU3J6,NU3J7,NU3J8,NU3J9,NU3K4,NU3K5,NU3K6,NU3K7,NU3K8,NU3K9,NU3L4,NU3L5,NU3L6,NU3L7,NU3L8,NU3L9,NV4I1,NV4I2,NV4I3,NV4I4,NV4I7,NV4J1,NV4J2,NV4J3,NV4K1,NV4K2,NV4K3,NV4L1,NV4L2,NV4L3,NV4M1,NV4M4,NV4M7,NV5I1,NV5I2,NV5I3,NV5J1,NV5J2,NV5J3,NV5K1,NV5K2,NV5K3,NV5L1,NV5L2,NV5L3,NV7A1,NW1M4,NW1M5,NW1M6,NW1M7,NW1M8,NW1M9,NW1N4,NW1N5,NW1N6,NW1N7,NW1N8,NW1N9,NW1O4,NW1O5,NW1O6,NW1O7,NW1O8,NW1O9,NW1P4,NW1P5,NW1P6,NW1P7,NW1P8,NW1P9,MT4H,MT4K,MT4L,MU5G,MU5H,MU5L,MV3G,MV3H,MV3K,MV3L,MT4F9,MT4G2,MT4G3,MT4G4,MT4G5,MT4G6,MT4G7,MT4G8,MT4G9,MT4J3,MT4J6,MT4O1,MT4O2,MT4O3,MT4O6,MT4P1,MT4P2,MT4P3,MT4P4,MT4P5,MT5E4,MT5E7,MT5I1,MT5I2,MT5I4,MT5I5,MT5I7,MT5M1,MU5C8,MU5C9,MU5D7,MU5D8,MU5D9,MU5K1,MU5K2,MU5K3,MU5K4,MU5K5,MU5K6,MU5K8,MU5K9,MU6A7,MU6E1,MU6E2,MU6E4,MU6E5,MU6E7,MU6E8,MU6I1,MU6I2,MU6I4,MU6I5,MU6I7,MV3C8,MV3C9,MV3D7,MV3F3,MV3F5,MV3F6,MV3F8,MV3F9,MV3J2,MV3J3,MV3J5,MV3J6,MV3J9,MV3O1,MV3O2,MV3O3,MV3P1,NU7K4,CV,DV,IV,JV,KQ,KV,KW,LR,LV,LW,LY,MS,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,JW2,JW3,JW4,JW5,JW6,JW7,JW8,JW9,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,MT1,MT2,MT3,MT6,MT7,MT8,MT9,MU1,MU2,MU3,MU4,MU7,MU8,MU9,MV1,MV2,MV4,MV5,MV6,MV7,MV8,MW6,MW7,MW8,MW9,MX1,MX2,MX3,MX4,MX7,MY1,MY4,MY7,MZ1,NS4,NS7,NS8,NS9,NT1,NT2,NT3,NT4,NT7,NU1,NU4,NU5,NU6,NU8,NU9,NV1,NV2,NV3,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,BV1A,BV1B,BV1C,BV1D,BV2A,BV2B,BV2C,BV2D,BV2G,BV2H,BV2K,BV2L,BV2O,BV2P,BV5C,BV5D,BV5G,BV5H,BV5K,BV5L,BV5O,BV5P,IW3A,IW3B,IW3C,IW3D,IW6I,IW6J,IW6K,IW6L,IW6M,IW6N,IW6O,IW6P,JW1A,JW1B,JW1C,JW1D,JW1F,JW1G,JW1H,JW1J,JW1K,JW1L,JW1N,JW1O,JW1P,KX3A,KX3B,KX3C,KX3D,KX6M,KX6N,KX6O,KX6P,LX1A,LX1B,LX1C,LX1D,LX1F,LX1G,LX1H,LX1L,LX1P,LX4D,LX4G,LX4H,LX4K,LX4L,LX4M,LX4N,LX4O,LX4P,MT4A,MT4B,MT4C,MT4D,MT4E,MT4I,MT4M,MT4N,MT5A,MT5B,MT5C,MT5D,MT5F,MT5G,MT5H,MT5J,MT5K,MT5L,MT5N,MT5O,MT5P,MU5A,MU5B,MU5E,MU5F,MU5I,MU5J,MU5M,MU5N,MU5O,MU5P,MU6B,MU6C,MU6D,MU6F,MU6G,MU6H,MU6J,MU6K,MU6L,MU6M,MU6N,MU6O,MU6P,MV3A,MV3B,MV3E,MV3I,MV3M,MV3N,MV9A,MV9B,MV9C,MW1A,MW1B,MW1C,MW1D,MW1E,MW1F,MW1G,MW1H,MW1I,MW1J,MW1K,MW1L,MW1M,MW1N,MW1O,MW2A,MW2B,MW2C,MW2D,MW2E,MW2F,MW2G,MW2H,MW2I,MW2J,MW2K,MW2L,MW2O,MW2P,MW3A,MW3E,MW3I,MW3M,MW3N,MW4A,MW4B,MW4C,MW4E,MW4F,MW4G,MW4I,MW4J,MW4K,MW4M,MW4N,MW4O,MW5C,MW5D,MW5G,MW5H,MW5K,MW5L,MW5O,MW5P,NT5A,NT5B,NT5C,NT5D,NT5E,NT5F,NT5G,NT5H,NT5I,NT5J,NT5K,NT5L,NT5M,NT5N,NT6A,NT6B,NT6C,NT6D,NT6E,NT6F,NT6G,NT6H,N</p>

Area	Sub-area name	HCIS
		<p>T6I,NT6J,NT6K,NT6L,NT8A,NT8B,NT8E,NT8F,NT8I,NT8J,NT8M,NT8N,N U2A,NU2B,NU2E,NU2F,NU2G,NU2I,NU2J,NU2K,NU2L,NU2M,NU2N,NU2 O,NU2P,NU3M,NU3N,NU3O,NU3P,NU7A,NU7B,NU7C,NU7D,NU7E,NU7 F,NU7G,NU7H,NU7I,NU7J,NU7L,NU7M,NU7N,NU7O,NU7P,NV4A,NV4B, NV4C,NV4D,NV4E,NV4F,NV4G,NV4H,NV5A,NV5B,NV5C,NV5D,NV5E,N V5F,NV5G,NV5H,BV1E1,BV1E2,BV1E3,BV1E4,BV1E5,BV1E6,BV1F1,BV 1F2,BV1F3,BV1F4,BV1F5,BV1F6,BV1G1,BV1G2,BV1G3,BV1G4,BV1G5, BV1G6,BV1H1,BV1H2,BV1H3,BV1H4,BV1H5,BV1H6,BV2E1,BV2E2,BV2 E3,BV2E4,BV2E5,BV2E6,BV2F1,BV2F2,BV2F3,BV2F4,BV2F5,BV2F6,BV 4M4,BV4M5,BV4M6,BV4M7,BV4M8,BV4M9,BV4N4,BV4N5,BV4N6,BV4N 7,BV4N8,BV4N9,BV4O4,BV4O5,BV4O6,BV4O7,BV4O8,BV4O9,BV4P4,B V4P5,BV4P6,BV4P7,BV4P8,BV4P9,BV5M4,BV5M5,BV5M6,BV5M7,BV5M 8,BV5M9,BV5N4,BV5N5,BV5N6,BV5N7,BV5N8,BV5N9,IW3E1,IW3E2,IW3 E3,IW3E4,IW3E7,IW3F1,IW3F2,IW3F3,IW3G1,IW3G2,IW3G3,IW3H1,IW3 H2,IW3H3,IW3I1,IW3I4,IW3I7,IW3M1,IW3M4,IW3M7,IW6A1,IW6A4,IW6A 7,IW6E1,IW6E4,IW6E7,JW1E1,JW1E2,JW1E3,JW1E5,JW1E6,JW1E8,JW 1E9,JW1I2,JW1I3,JW1I5,JW1I6,JW1I8,JW1I9,JW1M2,JW1M3,JW1M5,JW 1M6,JW1M7,JW1M8,JW1M9,KX3E1,KX3E2,KX3E3,KX3E4,KX3E5,KX3E6 ,KX3E7,KX3E8,KX3F1,KX3F2,KX3F3,KX3F4,KX3G3,KX3H1,KX3H2,KX3H 3,KX3I1,KX3I2,KX3I4,KX3I5,KX3I7,KX3M1,LX1E1,LX1E2,LX1E3,LX1E5,L X1E6,LX1J2,LX1J3,LX1K1,LX1K2,LX1K3,LX1K5,LX1K6,LX1K8,LX1K9,LX 4F3,LX4F6,LX4F9,LX4J3,LX4J6,LX4J9,MT4F1,MT4F2,MT4F3,MT4F4,MT 4F5,MT4F6,MT4F7,MT4F8,MT4G1,MT4J1,MT4J2,MT4J4,MT4J5,MT4J7, MT4J8,MT4J9,MT4O4,MT4O5,MT4O7,MT4O8,MT4O9,MT4P6,MT4P7,MT 4P8,MT4P9,MT5E1,MT5E2,MT5E3,MT5E5,MT5E6,MT5E8,MT5E9,MT5I3, MT5I6,MT5I8,MT5I9,MT5M2,MT5M3,MT5M4,MT5M5,MT5M6,MT5M7,MT5 M8,MT5M9,MU5C1,MU5C2,MU5C3,MU5C4,MU5C5,MU5C6,MU5C7,MU5 D1,MU5D2,MU5D3,MU5D4,MU5D5,MU5D6,MU5K7,MU6A1,MU6A2,MU6 A3,MU6A4,MU6A5,MU6A6,MU6A8,MU6A9,MU6E3,MU6E6,MU6E9,MU6I3 ,MU6I6,MU6I8,MU6I9,MV3C1,MV3C2,MV3C3,MV3C4,MV3C5,MV3C6,MV 3C7,MV3D1,MV3D2,MV3D3,MV3D4,MV3D5,MV3D6,MV3D8,MV3D9,MV3 F1,MV3F2,MV3F4,MV3F7,MV3J1,MV3J4,MV3J7,MV3J8,MV3O4,MV3O5, MV3O6,MV3O7,MV3O8,MV3O9,MV3P2,MV3P3,MV3P4,MV3P5,MV3P6,M V3P7,MV3P8,MV3P9,MV9D1,MV9D2,MV9D3,MV9D4,MV9D5,MV9D7,MV 9D8,MV9E1,MV9E2,MV9E3,MV9F1,MV9F2,MV9F3,MV9G1,MV9G2,MV9 G3,MV9H1,MV9H2,MW1P1,MW1P2,MW1P3,MW2M1,MW2M2,MW2M3,M W2N1,MW2N2,MW2N3,MW3B1,MW3B4,MW3B7,MW3F1,MW3F4,MW3F7 ,MW3J1,MW3J4,MW3J5,MW3J6,MW3J7,MW3J8,MW3J9,MW3O4,MW3O 5,MW3O6,MW3O7,MW3O8,MW3O9,MW3P4,MW3P5,MW3P6,MW3P7,M W3P8,MW3P9,MW4P4,MW4P5,MW4P6,MW4P7,MW4P8,MW4P9,MW5M 4,MW5M5,MW5M6,MW5M7,MW5M8,MW5M9,MW5N4,MW5N5,MW5N6,M W5N7,MW5N8,MW5N9,NT5O1,NT5O2,NT5O3,NT5P1,NT5P2,NT5P3,NT6 M1,NT6M2,NT6M3,NT6N1,NT6N2,NT6N3,NT6O1,NT6O2,NT6O3,NT6P1, NT6P2,NT6P3,NU2C4,NU2C5,NU2C6,NU2C7,NU2C8,NU2C9,NU2D4,NU 2D7,NU2H1,NU2H4,NU2H5,NU2H6,NU2H7,NU2H8,NU2H9,NU3E4,NU3E 7,NU3I1,NU3I4,NU3I5,NU3I6,NU3I7,NU3I8,NU3I9,NU3J4,NU3J5,NU3J6,N U3J7,NU3J8,NU3J9,NU3K4,NU3K5,NU3K6,NU3K7,NU3K8,NU3K9,NU3L4 ,NU3L5,NU3L6,NU3L7,NU3L8,NU3L9,NU7K1,NU7K2,NU7K3,NU7K5,NU7 K6,NU7K7,NU7K8,NU7K9,NV4I1,NV4I2,NV4I3,NV4I4,NV4I7,NV4J1,NV4J 2,NV4J3,NV4K1,NV4K2,NV4K3,NV4L1,NV4L2,NV4L3,NV4M1,NV4M4,NV 4M7,NV5I1,NV5I2,NV5I3,NV5J1,NV5J2,NV5J3,NV5K1,NV5K2,NV5K3,NV 5L1,NV5L2,NV5L3,NV7A1,NW1M4,NW1M5,NW1M6,NW1M7,NW1M8,NW 1M9,NW1N4,NW1N5,NW1N6,NW1N7,NW1N8,NW1N9,NW1O4,NW1O5,N W1O6,NW1O7,NW1O8,NW1O9,NW1P4,NW1P5,NW1P6,NW1P7,NW1P8, NW1P9</p>

Area	Sub-area name	HCIS
Australia-wide	–	AR8, AR9, AS2, AS3, AS5, AS6, AS8, AS9, AT1, AT2, AT3, AT5, AT6, AT8, AT9, AU2, AU3, AU6, AU9, AV9, AW3, BR, BS, BT, BU, BV, BW1, BW2, BW3, BW5, BW6, CR, CS, CT, CU, CV, CW1, CW2, CW3, CW4, DQ, DR, DS, DT, DU, DV, DW1, DW2, DW3, EP, EQ, ER, ES, ET, EU, EV1, EV2, EV3, EV4, EV5, EV6, EV7, FP, FQ, FR, FS, FT, FU, FV1, FV2, FV3, FV4, FV5, GO3, GO4, GO5, GO6, GO7, GO8, GO9, GP, GQ, GR, GS, GT, GU, GV1, GV2, GV3, GV6, HO, HP, HQ, HR, HS, HT, HU, HV1, HV2, HV3, HV4, HV5, HV6, HV8, HV9, HW3, HW6, IO, IP, IQ, IR, IS, IT, IU, IV, IW, JO, JP, JQ, JR, JS, JT, JU, JV, JW, JX1, JX2, JX3, JX5, JX6, KO1, KO4, KO5, KO7, KO8, KP1, KP2, KP4, KP5, KP6, KP7, KP8, KP9, KQ, KR, KS, KT, KU, KV, KW, KX1, KX2, KX3, KX4, KX5, KX6, KX8, KX9, KY2, KY3, KY6, LP4, LP7, LQ1, LQ2, LQ4, LQ5, LQ7, LQ8, LR, LS, LT, LU, LV, LW, LX, LY, LZ1, LZ2, LZ3, MR1, MR4, MR5, MR7, MR8, MR9, MS, MT, MU, MV, MW, MX1, MX2, MX3, MX4, MX7, MY1, MY4, MY7, MZ1, NS4, NS7, NS8, NS9, NT, NU, NV1, NV2, NV3, NV4, NV5, NV7, NW1

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