Planning for wireless broadband use in urban areas in the 3400–3475 MHz band

Outcomes paper

December 2021

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[Executive summary 1](#_Toc89250830)

[3.4 GHz technical framework 1](#_Toc89250831)

[Use of urban excise areas 2](#_Toc89250832)

[Introduction 4](#_Toc89250833)

[Scope of this paper 5](#_Toc89250834)

[Legislative and policy environment 5](#_Toc89250835)

[Spectrum planning outcomes development 7](#_Toc89250836)

[Process to date 9](#_Toc89250837)

[Issues considered in the options paper 9](#_Toc89250838)

[Discussion of submissions 11](#_Toc89250839)

[Planning outcomes 22](#_Toc89250840)

[Planning decisions 22](#_Toc89250841)

[Update on urban excise work 23](#_Toc89250842)

[Next steps 26](#_Toc89250843)

[Appendix A: Geographical area description 28](#_Toc89250844)

[Appendix B: Options for use of urban excise areas 30](#_Toc89250845)

[Appendix C: List of consultation respondents 32](#_Toc89250846)

Executive summary

On 27 August 2021, the ACMA released the [*Planning for wireless broadband use in urban areas in the 3400–3475 MHz band – Options paper*](https://www.acma.gov.au/consultations/2021-08/planning-wireless-broadband-use-urban-areas-3400-3475-mhz-band-consultation-312021) (the options paper). It proposed changes to the 3.4 GHz spectrum licence technical framework and options for the future use of the 3400–3475 MHz band in ‘urban excise areas’. These are the areas for which NBN Co recently surrendered apparatus licences that are not required for the provision of its terrestrial wireless broadband (WBB) services (refer to [Appendix A](#_Appendix_A:_Geographical) for a definition of these areas).

Feedback to the options paper closed on 30 September 2021 and we received 14 submissions. A summary and response to submissions is provided in this paper.

After reviewing submissions, we have decided to make the amendments to the 3.4 GHz technical framework and have progressed our consideration of options for use of urban excise areas.

Some of the proposed changes to the 3.4 GHz technical framework are being made to enable NBN Co to re-register radiocommunications devices near urban excise areas following the defragmentation of its licence holdings. NBN Co is required to register its devices by 15 February 2022. This means relevant changes to the 3.4 GHz technical framework need to be in place before then.

While changes proposed to the 3.4 GHz technical framework and consideration of options for use of spectrum in the urban excise areas were combined in the same consultation paper, they are separate considerations and can be implemented independently of each other.

Consequently, we have decided to progress changes to the 3.4 GHz technical framework ahead of making decisions on the use of spectrum in the urban excise areas. This will provide time for us to consider the best use of spectrum in the urban excise areas in the broader context of our work to implement arrangements for wireless broadband in the 3400–4000 MHz band.

## 3.4 GHz technical framework

The options paper proposed amendments to the following aspects of the 3.4 GHz technical framework:

The [Radiocommunications (Unacceptable Levels of Interference – 3.4 GHz Band) Determination 2015](https://www.legislation.gov.au/Series/F2015L00727)(the s.145(4) Determination).

The 3.4 GHz spectrum licence core conditions relating to receiver spurious emissions.

The [*Radiocommunications Assignment and Licensing Instruction MS44 – Frequency coordination procedures for the earth station protection zones*](https://www.acma.gov.au/publications/2019-08/instruction/frequency-coordination-procedures-earth-station-protection-zones)(RALI MS44).

Submissions received supported the proposed amendments. Additional minor changes were suggested to the draft Radiocommunications (Unacceptable Levels of Interference – 3.4 GHz Band) Amendment Determination 2021 (No. 1).

The ACMA has subsequently decided to implement the changes to the s.145(4) Determination, receiver spurious emission limits in spectrum licences and RALI MS44 that were detailed in the options paper. This also includes the additional proposed changes to the Radiocommunications (Unacceptable Levels of Interference – 3.4 GHz Band) Amendment Determination 2021 (No. 1).

## Use of urban excise areas

The paper identified four options to support WBB use of the 3400–3475 MHz band in urban excise areas. These are summarised in Table 1, with further detail provided at [Appendix B](#_Appendix_B:_Options). Each option involves different considerations for:

macro-cell[[1]](#footnote-2) or restricted cell[[2]](#footnote-3) deployment models

single or multiple operators per channel in an urban excise area (exclusive versus shared access).

Summary of options for use of urban excise spectrum

| Option | Deployment model | Restricted use band | Access type | Licence model |
| --- | --- | --- | --- | --- |
| Option 1 | 3400–3460 MHz: Macro-cell | 3460–3475 MHz: 15 MHz | Exclusive | Spectrum licence / area-wide apparatus licence (AWL) |
| Option 2 | 3400–3470 MHz: Restricted cell | 3470–3475 MHz: 5 MHz | Exclusive | Spectrum licence / AWL |
| Option 3 | 3400–3470 MHz: Restricted cell | 3470–3475 MHz: 5 MHz | Shared | Apparatus (site based or AWL) / class licence |
| Option 4 | 3400–3460 MHz: Macro-cell  3460–3470 MHz: Restricted cell | 3470–3475 MHz: 5 MHz | Exclusive | Spectrum licence / AWL |

The ACMA identified Option 4 as its preliminary preferred option. It was considered that this best promoted the long‑term public interest derived from use of the   
3400–3475 MHz band.

Views on the preferred option for use of urban excise areas varied:[[3]](#footnote-4)

NBN Co and private wireless broadband (WBB) submissions primarily supported Option 3, although there was some support for Option 2.

Mobile industry submissions primarily supported Option 4 (implementing Option 2 in the upper 15 MHz), with a secondary preference for Option 1.

One confidential submission did not support WBB services being deployed using the 3400–3475 MHz band in urban excise areas.

Several submissions also linked outcomes in urban excise areas to the work underway to develop arrangements for WBB across the broader 3400–4000 MHz band. It was suggested that planning guidelines be created considering the entire 3400–4000 MHz band, to show where we believe different use cases should reside. This would allow technical arrangements to be developed and optimised based on these groupings.

In relation to the submission that did not support use of urban excise areas for WBB services, we have previously consulted on this issue as part of the [3400–3575 MHz optimisation process](https://www.acma.gov.au/consultations/2019-08/optimising-3400-3575-mhz-band-consultation-122019). The outcomes of this process identified making the urban excise areas available for WBB use. The ACMA does not intend to revisit this decision.

After reviewing submissions, we believe that Options 3 and 4 should be considered further for implementation in urban excise areas. We will reassess both these options, taking into account relevant feedback. To ensure the best long-term outcomes are adopted, these will also be considered in the context of work that is underway to develop planning and allocation arrangements for WBB use across the broader 3400-4000 MHz band.

In February 2022, we plan to consult on the re-allocation of spectrum in the 3400–3800 MHz band for the issue of spectrum licences pursuant to section 153B of the *Radiocommunications Act 1992* (the Act). We intend to provide additional explanation of the broader 3400–4000 MHz band planning and allocation issues, including the purposes for which urban excise spectrum may be used. We also plan to conduct a [spectrum tune-up](https://www.acma.gov.au/spectrum-tune-ups) on 3400–4000 MHz band-related issues in the second quarter of 2022. This will provide an opportunity for us to workshop our ideas. We aim to decide on the use of urban excise areas in mid-2022.

By combining further discussion on this issue with the s.153B consultation, the ACMA is seeking to reduce the number of separate consultation processes that stakeholders need to consider and to expose some of the broader issues for consideration in the 3400-4000 MHz band. It does not mean we have made a decision to issue spectrum licences in urban excise areas.

Once a decision has been made, we will commence implementation, which will include finalising interference management criteria, developing administrative policy guidance – such as radiocommunications assignment and licensing instructions (RALIs) – and making/updating relevant legislative instruments. Where appropriate, any work will be combined with similar projects being conducted to implement the [*Replanning the 3700–4200 MHz band – Outcomes paper*](https://www.acma.gov.au/consultations/2020-07/planning-options-3700-4200-mhz-band-consultation-222020).

# Introduction

In November 2019, the ACMA released the paper [*Optimising arrangements for the 3400–3575 MHz band – Planning decisions and preliminary views*](https://www.acma.gov.au/consultations/2019-08/optimising-3400-3575-mhz-band-consultation-122019) (the 2019 outcomes paper).It outlined our proposals to defragment apparatus licence arrangements and spectrum licence holdings in the 3400–3575 MHz band. Since releasing the paper, we have been working to implement the planning outcomes.

Key announcements in the 2019 outcomes paper included:

An intention to vary [*Radiocommunications assignment and licensing instruction MS44 – Frequency coordination procedures for the earth station protection zones*](https://www.acma.gov.au/publications/2019-08/instruction/frequency-coordination-procedures-earth-station-protection-zones)(RALI MS44) so that earth station protection zones (ESPZs) in eastern Australia cover those parts of the band not subject to spectrum licensing.

Plans to convert NBN Co’s apparatus licences in the 3400–3575 MHz band to spectrum licences. This was done to facilitate spectrum licensees in the 3400–3575 MHz band to defragment their spectrum holdings in most areas (‘defrag’). The conversion and defrag processes were completed in June and July 2021 respectively.

NBN Co surrendering any licences it holds in urban areas in which it does not plan to provide terrestrial wireless broadband (WBB) services (‘urban excise’ areas).[[4]](#footnote-5) We also committed to working with industry to investigate ways to make this spectrum available for use by other WBB operators. NBN Co surrendered their licences in urban areas in August 2021.

To progress consideration of these issues, on 27 August 2021 we released the [*Planning for wireless broadband use in urban areas in the 3400–3475 MHz band – Options paper*](https://www.acma.gov.au/consultations/2021-08/planning-wireless-broadband-use-urban-areas-3400-3475-mhz-band-consultation-312021) (the options paper). We also took the opportunity to consult on possible changes to the 3.4 GHz spectrum licence technical framework (the 3.4 GHz technical framework). This included consequential changes to support the NBN licence conversion process, general updates to the [Radiocommunications (Unacceptable Levels of Interference – 3.4 GHz Band) Determination 2015](https://www.legislation.gov.au/Series/F2015L00727)(the s.145(4) Determination), and aligning receiver spurious emission limits with international standards.

Discussion of issues in the option paper was divided into updates to the 3.4 GHz technical framework and options for use of urban excise areas. Feedback to the options paper closed on 30 September 2021. Fourteen submissions were received to the paper.

After reviewing submissions, we have decided to proceed with making the amendments to the 3.4 GHz technical framework, with further work underway to consider options for use of urban excise areas.

Some of the proposed changes to the 3.4 GHz technical framework are being made to enable NBN Co to re-register devices near urban excise areas following the defragmentation of their licence holdings. NBN Co is required to register its devices by 15 February 2022. This means relevant changes to the 3.4 GHz technical framework need to be in place before then. While changes proposed to the 3.4 GHz technical framework and consideration of options for use of spectrum in urban excise areas were combined in the same consultation paper, they are separate matters and can be implemented independently.

Consequently, we have decided to progress changes to the 3.4 GHz technical framework ahead of making decisions on the use of spectrum in urban excise areas. This will provide time for us to consider the best use of spectrum in urban excise areas in the broader context of our work to implement arrangements for wireless broadband (WBB) in the 3400–4000 MHz band.

## Scope of this paper

The purpose of this paper is to:

provide a summary and response to submissions made to the options paper

present decisions made regarding amendments to the 3.4 GHz technical framework and outline the next steps to implement them

provide an update on the ACMA’s consideration of options for use of urban excise areas and the planned timeframe for making a decision.

## Legislative and policy environment

Managing spectrum efficiently and effectively for the benefit of all Australians is a key priority for the ACMA.[[5]](#footnote-6)

### Guiding legislation and policy

The ACMA’s decisions are guided by the object of the Act to promote the long‑term public interest derived from the use of the spectrum by providing for the management of the spectrum in a manner that:

1. facilitates the efficient planning, allocation and use of the spectrum
2. facilitates the use of the spectrum for:
   1. commercial purposes
   2. defence purposes, national security purposes and other non‑commercial purposes (including public safety and community purposes)
3. supports the communications policy objectives of the Commonwealth Government.

On 10 December 2020, the Minister for Communications, Cyber Safety and the Arts, the Hon Paul Fletcher MP, made a notice designating parts of the 3.4 GHz band for spectrum licensing.[[6]](#footnote-7) The areas and frequencies covered by the notice encompass apparatus licences held by NBN Co. The notice has allowed us to convert NBN Co’s apparatus licences to spectrum licences, facilitating defragmentation of the 3.4 GHz band. NBN Co uses this spectrum to provide fixed-wireless services in regional and outer-metropolitan areas. The Explanatory Statement to the Minister’s designation notice noted the government’s expectation that ‘ACMA will work with NBN Co to make underutilised spectrum in inner-metropolitan areas of NBN Co’s spectrum licences available for licensing by other operators, subject to the development of appropriate interference management criteria and assessment of the utility of the spectrum’.

Several communications policy objectives relevant to the replanning considerations in this band have been identified.

The government’s [*Digital Economy Strategy*](https://digitaleconomy.pmc.gov.au/sites/default/files/2021-07/digital-economy-strategy.pdf) *2030*, released in 2021, sets out how Australia will secure its future as a modern and leading digital economy and society by 2030. The strategy identified that digital infrastructure was a key enabler making it possible to access the digital world. The strategy noted that the government is supporting the roll out of 5G services through the timely availability of spectrum, streamlining deployment arrangements and showcasing trials of 5G use cases to promote business uptake.

The [5G—Enabling the future economy](https://www.infrastructure.gov.au/media-centre/5g-enabling-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](https://www.industry.gov.au/news-media/australias-tech-future), released in December 2018, sets out the Australian Government’s strategy for the nation’s technological 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.

On 17 November 2021, the Department of Prime Minister and Cabinet released the Australian Government’s [Action Plan for Critical Technologies](https://www.pmc.gov.au/resource-centre/domestic-policy/action-plan-critical-technologies). This outlines a vision for protecting and promoting critical technologies in Australia’s national interest, including advanced radiofrequency communications – 5G and 6G technologies. The blueprint is underpinned by 4 goals and 7 action pillars, with a focus on promoting and protecting critical technologies through a national interest lens that balances the economic opportunities of critical technologies with their national security risks.

### Other relevant advice

We note the [Australian Government’s response](https://www.infrastructure.gov.au/department/ips/government_responses/government-response-next-gen-future.aspx) of November 2020 to the parliamentary report [*Next Gen Future: Inquiry into the deployment, adoption and application of 5G in Australia*](https://www.aph.gov.au/Parliamentary_Business/Committees/House/Communications/5G/Report). In particular, we acknowledge 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 currently 3 licence types available to authorise access to spectrum –spectrum, apparatus and class licences. Each of these has differing characteristics with respect to the allocation method commonly used, approach to pricing, associated level of exclusivity and interference environment. These approaches influence how options can be developed and implemented.

On 17 June 2021, amendments to the Actmade by the *Radiocommunications Legislation Amendment (Reform and Modernisation) Act 2020* (the Modernisation Act) came into force. The amendments allow for greater flexibility for the ACMA to manage spectrum and greater clarity to licensees. More information on the amendments can be found on the [ACMA website](https://www.acma.gov.au/radcomms-licensing-and-allocation-reform). We have developed an [overview of our approach](https://www.acma.gov.au/publications/2021-03/rules/our-approach-radcomms-licensing-and-allocation) to implementing the changes to licensing and allocation of spectrum.

A spectrum licence authorises the operation of radiocommunications 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 by an auction and have historically been utilised for most bands used to deploy commercial mobile broadband networks. Spectrum licences may be allocated for up to 20 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 conditions[[7]](#footnote-8) and do not usually 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 radiocommunications 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 20 years. They are typically issued ‘over-the-counter’ in accordance with coordination policies developed by the ACMA. We [impose cost recovery](https://www.acma.gov.au/fees-apparatus-licences) charges, and separate legislation imposes taxes in relation to apparatus licences. These amounts cover our costs and create incentives to use spectrum efficiently.

The ACMA has also created a new apparatus licence type – the [area-wide apparatus licence](https://www.acma.gov.au/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 in 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 is 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 us for an individual licence (hence no 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.

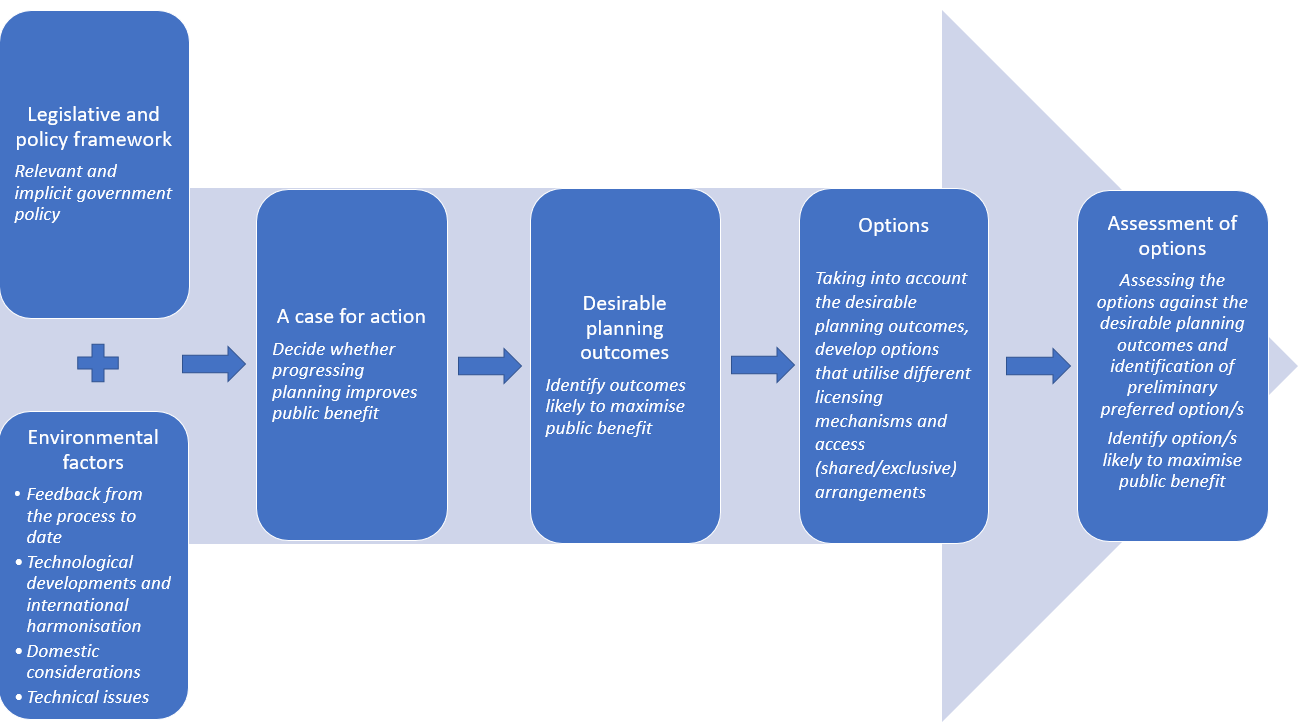
## Spectrum planning outcomes development

We are guided in our spectrum management functions by the object of the Act, set out in [Guiding legislation and policy](#_Guiding_legislation_and). 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.

Figure 2 describes the approach we have used in developing and assessing options for the use of urban excise areas in the 3400–3475 MHz band. This approach led to the formation of the ACMA’s preliminary preferred option for replanning the band as detailed in the options paper.

In determining the planning outcomes presented in this paper, we have 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.

1. Spectrum planning options framework



# Process to date

This chapter summarises the issues for comment in the options paper, the main themes in submissions and the ACMA’s response to them.

## Issues considered in the options paper

In the options paper, the ACMA sought comment on proposed amendments to the technical framework for 3.4 GHz spectrum licences (the 3.4 GHz technical framework) and options to support WBB use of the 3400–3475 MHz band in urban excise areas.

### Proposed amendments to the 3.4 GHz technical framework

The options paper proposed the following amendments to the 3.4 GHz technical framework:

Amendments to the [Radiocommunications (Unacceptable Levels of Interference – 3.4 GHz Band) Determination 2015](https://www.legislation.gov.au/Series/F2015L00727)(the s.145(4) Determination). These included:

General changes that aligned with those identified and implemented in the review of the [2.3 GHz technical framework](https://www.acma.gov.au/consultations/2020-12/review-23-ghz-spectrum-licencing-technical-framework-consultation-372020). These changes will enable spectrum licensees to deploy services closer to the geographical boundaries of their licence, subsequently increasing utility of the spectrum.

Additional changes to ensure NBN Co is not prevented from re-registering radiocommunications devices for existing services in the 3400–3475 MHz band located near urban excise areas.

Amendments to the 3.4 GHz spectrum licence core conditions relating to receiver spurious emissions to align with international standards.

Amendments to [*Radiocommunications assignment and licensing instruction MS44 – Frequency coordination procedures for the earth station protection zones*](https://www.acma.gov.au/publications/2019-08/instruction/frequency-coordination-procedures-earth-station-protection-zones)(RALI MS44) so that earth station protection zones (ESPZs) in eastern Australia cover those parts of the band not subject to spectrum licensing in the 3400-3575 MHz band

### Options for use of urban excise areas

The options paper identified four options to support the WBB use of the 3400-3475 MHz band in urban excise areas. These are summarised in Figure 2 with more detail provided at Appendix B. Each option involves support for different combinations of:

macro-cell or restricted cell deployment models

single or multiple operators per channel in an urban excise area.

1. Pictorial description of options for urban excise use[[8]](#footnote-9)

Graphical user interface, text, application, email

Description automatically generated

To assist with assessing each option, we identified 4 desirable planning outcomes. These were:

Provide adequate protection to incumbent NBN Co services in adjacent areas.

Ensure NBN Co is not unreasonably constrained in its ability to deploy new and more spectrally efficient technologies in the future (e.g., moving from 4G to 5G technologies).

Minimise the impact any new arrangements may have on existing 3.4 GHz spectrum licences above 3475 MHz.

Maximise the utility of spectrum in urban excise areas for new WBB services.

Preliminary criteria to manage interference to and from services operating in urban excise areas were presented for each option. These were presented for information to assist stakeholders in developing views on a preferred option. Stakeholders were free to provide their views on the possible criteria as part of a response to the options paper. Pending a decision on an implementation option, it was indicated the ACMA would consult further on the interference management criteria before finalising and implementing them.

The ACMA identified Option 4 as its preliminary preferred option. It was considered that this option best promoted the long‑term public interest derived from use of the 3400–3475 MHz band, on the basis that:

It provides the greatest technical flexibility for how operators can use urban excise areas. This includes support for both macro and restricted cell deployments.

It minimises spectrum incorporated into restricted use bands.

It is expected to result in greater spectrum utility in the 3460–3475 MHz frequency range.

In any given area, multiple operators could be supported by licensing them in different segments of the 3400–3475 MHz frequency range.

The options paper stated that once a decision has been made on which option to adopt, we would then commence work to implement the outcome associated with the relevant option, including finalising interference management criteria, developing RALIs and making/updating relevant legislative instruments. Where it makes sense to do so, it is proposed any work will be combined with similar work being conducted to implement the [*Replanning the 3700–4200 MHz band – Outcomes paper*](https://www.acma.gov.au/consultations/2020-07/planning-options-3700-4200-mhz-band-consultation-222020).

## Discussion of submissions

Fourteen submissions to the options paper consultation were received, including one confidential submission. The public submissions can be found on the [ACMA’s website](https://www.acma.gov.au/consultations/2021-08/planning-wireless-broadband-use-urban-areas-3400-3475-mhz-band-consultation-312021), with a list of the submitters provided at [Appendix C](#_Appendix_C:_List).

Response summaries are grouped according to feedback received on amendments to the different aspects of the 3.4 GHz technical framework and issues related to the options for use of urban excise areas.

### Proposed amendments to the s.145(4) Determination

The proposed changes to the s.145(4) Determination were supported by most submissions that commented on this issue. Submissions from the Australian Critical Communications Forum (ACCF), Simoco Wireless Solutions (SWS) and the Australian Radio Communications Industry Association (ARCIA) indicated they did not support macro cell usage within urban excise areas. They felt the proposed changes to the determination would become unnecessary if their preferred option use of urban excise areas were adopted.

Submissions from AMTA, Optus and Telstra raised the following additional issues:

* It was not clear why the current subsection 9(2) is being removed. There is preference to retain this clause and adopt the proposed new changes.
* There was general support for the proposal to include additional measures to expand the grandfathering clause (in the proposed new section 11) so that it would continue to apply to radiocommunications devices when minor modifications to devices are made. As well, there was a preference for any modifications to devices to be reflected in the Register of Radiocommunications Licences (the RRL) – regardless of whether those modifications cause little or no change to the calculated device boundary criteria. This information was considered vital for performing coordination activities.
* Noting that NBN Co is required to re-register all relevant radiocommunications devices that were retuned as part of the defrag process by 15 February 2022, thereafter NBN Co should be required to comply with all registration requirements without exception.

RF Industries Pty Ltd (RFI) requested a review of the definitions for a group of transmitters and receivers and specific parts of Schedule 3 of the s.145(4) Determination. They requested this to provide better support for low-power and indoor applications which could be located within 20 metres of each other and deployments that could utilise multiple low power transceivers throughout a building or campus.

***ACMA response***

We note the broad support for the proposed amendments to the s.145(4) Determination. We also note that the changes proposed are not intended to reflect how urban excise areas are used (i.e., under either a macro or restricted cell model). At present the s.145(4) Determination only applies to services deployed under existing 3.4 GHz spectrum licences held by NBN Co, Optus, Telstra and TPG. Measures to manage co-channel interference to and from urban excise areas are being considered separately. Initial proposals to manage interference for the macro and restricted cell scenarios were presented at Appendix E of the options paper.

Regarding the additional issues raised in submissions:

* The ACMA had proposed to remove the existing subsection 9(2)[[9]](#footnote-10) of the s.145(4) Determination, as it was felt that existing subsection 9(4)[[10]](#footnote-11) made it redundant. However, we understand there may be circumstances that have not been envisioned where this may not be the case. Consequently, we will retain the existing subsection 9(2).
* The ACMA will include additional measures to expand the grandfathering clause in the proposed new section 11.[[11]](#footnote-12) This will enable licensees to make minor modifications to existing radiocommunications devices that would result in a device boundary that is the same or smaller when using the criteria that applied when the device was originally registered. To address concerns raised, we will include a statement in section 11 that requires the details of a device be updated in the RRL to reflect any changes.
* The ACMA confirms that NBN Co is required to register all relevant radiocommunications devices affected by the defrag process in the RRL by 15 February 2022.
* The ACMA does not consider that changes to the definitions for a group of transmitters and receivers and specific parts of Schedule 3 are required to support low power and indoor devices. This is because these terms only apply to devices that are required to be registered on the RRL. Flexibility for the deployment of low power and indoor devices is provided by the exemption from registration clause on all 3.4 GHz spectrum licences. This exempts devices that operate with a total radiated power (TRP) less than or equal to 28 dBm per occupied bandwidth from being registered on the RRL.

The ACMA will amend the s.145(4) Determination based on the assessment of submissions described above.

### Proposed amendments to receiver spurious emission limits

All submissions that commented on this proposal supported aligning receiver spurious emission limits with 3GPP standards. It was noted this would allow Australia to align with international standards and access global market for equipment and the associated economies of scale.

A few submissions queried whether NBN Co would be required to meet the new limits.

***ACMA response***

We note the support for this proposal in submissions and will work to implement the changes as proposed. As this relates to a change in core conditions, the changes will only be made on a licence-by-licence basis if there is agreement from a licensee in accordance with section 72 of the Act.

We can also confirm that, if adopted, all 3.4 GHz spectrum licensees would be required to meet the proposed receiver spurious emissions limits, including NBN Co and mobile network operators (MNOs).

### Proposed amendments to RALI MS44 concerning earth station protection zones

All submissions that commented on this proposal supported the proposed changes to RALI MS 44.

***ACMA response***

We note the support for this proposal in submissions. We also note that the draft RALI MS44, i.e., Appendix C to the options paper, incorrectly identified the additional frequency ranges for defined ESPZs would be 3400–3425 MHz and 3492.5–3542.5 MHz. The correct frequency ranges were detailed in the body of the options paper. These are the 3400–3442.5 MHz and 3475–3542.5 MHz bands, which also reflects what was discussed and agreed within the 3.4 GHz Technical Liaison Group (TLG). These frequencies represent the portions of the band not currently subject to spectrum licensing in the Moree, Roma and Uralla ESPZs.

Considering comments received and previous support within the TLG, we do not expect any issues with adopting the 3400–3442.5 MHz and 3475–3542.5 MHz frequency ranges. We have updated [RALI MS44](https://www.acma.gov.au/publications/2019-08/instruction/frequency-coordination-procedures-earth-station-protection-zones) accordingly.

### Desirable planning outcomes for use of spectrum in urban excise areas

While submissions were broadly supportive of the desirable planning outcomes, private WBB sector submissions[[12]](#footnote-13) called for further emphasis to be given to the ‘pent-up demand’ for spectrum to support localised private and enterprise networks, including services at warehouses, factories, airports, ports, transport, hospitals, schools and smart buildings. These submissions argued that the lack of dedicated spectrum in urban areas is inhibiting the adoption of new technologies by industry to support the Internet of Things (IoT), intelligent transport systems (ITS), smart cities, smart utility applications and other Industry 4.0[[13]](#footnote-14) opportunities. These technologies would result in greater economic outputs and increase Australia’s competitiveness in the global marketplace. The private WBB sector submissions also argued that while class licensed bands and 26/28 GHz spectrum options are available, these bands are not suitable substitutes for interference managed mid-band spectrum that could be made available in the 3400–3475 MHz band.

Telstra proposed some planning principles for consideration in the selection of the best option:

* Maximise the population covered.
* Encourage homogeneity.
* Allow flexibility for technology to evolve.
* Promote certainty of investment.

Further details on these principles are provided in the Telstra submission.

***Preliminary ACMA response***

The ACMA notes the support for our desirable planning outcomes. We acknowledge interest in making spectrum available for localised private and enterprise networks. We will consider this, as well as matters raised in other submissions, when re-assessing the planning options against desirable planning Outcome 4 – ‘Maximise the utility of spectrum in urban excise areas for new wireless broadband services’.

While the 3400–3475 MHz band presents one potential opportunity for private WBB use in urban areas, there are others to consider. The [*Spectrum options optimised for local area wireless broadband service*](https://www.acma.gov.au/local-area-wireless-broadband-services)information paper details existing spectrum options for private WBB use. We are also working to make additional spectrum available in other bands. Stakeholders may wish to consider these to support Industry 4.0 applications. Some key bands are:

[928–935 MHz](https://www.legislation.gov.au/Series/F2015L01438): Currently available for IoT applications via class licensing.

[3800–4000 MHz](https://www.acma.gov.au/local-area-wireless-broadband-services): The ACMA is in the process of developing arrangements for apparatus licensed WBB use of this band.

[5850–5925 MHz](https://www.acma.gov.au/licences/intelligent-transport-systems-class-licence): Currently available for ITS applications via class licensing.

[5925–6425 MHz](https://www.acma.gov.au/consultations/2021-10/radio-local-area-networks-rlans-6-ghz-band-consultation-372021): The ACMA is consulting on changes to support radio local area networks use of the band via class licensing.

[24.25–25.1 GHz](https://www.acma.gov.au/local-area-wireless-broadband-services): Currently available for private WBB use via class licencing.

[24.7–25.1 GHz and 27.5–29.5 GHz](https://www.acma.gov.au/local-area-wireless-broadband-services): Currently available for apparatus licensed private WBB use.

### Options for use of urban excise areas

Submissions on this issue generally fell into the following categories:

Support for a restricted cell model: This included interest in making spectrum available in a manner suitable for localised private and enterprise WBB networks – this includes appropriate licensing and allocation mechanisms. NBN Co and private WBB submissions supported this approach.

Support for a macro cell model: This included interest in making the spectrum available in a manner that provides the greatest flexibility for how services are deployed (macro or restricted cell). It limits access to individual urban excise areas to one operator per frequency segment to minimise dead zones. This incorporates support for the use of an exclusive licensing model via the issue of spectrum licences. AMTA, Optus and Telstra (collectively referred to as the mobile broadband industry) supported this approach.

Do not support WBB use: One confidential submission, from a member of the public, did not support WBB services being deployed using the 3400-3475 MHz band in urban excise areas.

***Support for a restricted cell model***

NBN Co considered the macro cell model in Options 1 and 4 presented a greater risk of interference. For this reason, NBN Co believed the restricted cell model under Options 2 or 3 would provide the most effective and appropriate co-existence protections. NBN Co indicated it could support Option 4 if no macro cell deployments are permitted in the 3800–4000 MHz band, and provided its current and future deployments can operate interference-free.

NBN Co stated that any outcome needs to protect its existing and planned services and ensure that it is not unreasonably constrained in its ability to deploy new technologies to meet future capacity growth. It indicated that of their 2200 sites offering services, 600 directly adjacent to urban excise areas are solely reliant on spectrum in the 3400–3475 MHz band. While NBN Co indicated that it also held 28 GHz spectrum in these areas, these services would still rely on 3400–3475 MHz spectrum as an anchor layer.

Private WBB submissions primarily indicated support for Option 3 as it will assist industry to create and supply markets for private and enterprise wireless broadband solutions. Some, however, also supported Option 2. Some submissions indicated support for Option 4 as a fallback option, provided Option 3 is implemented in the upper 15 MHz. DB Telecoms also suggested it could support Option 4 if no macro cell deployments are supported in the 3800–4000 MHz band.

The reasons private WBB submissions gave for their preferred option were:

The ACMA’s preferred approach favoured MNOs and such an outcome would not result in ‘new WBB services’ being deployed, as stated in desirable planning Outcome (4), only more capacity for MNOs. Further, if Option 3 were implemented, it would create opportunities for more operators to design systems to meet the specific needs of the user’s industry, in preference to the ‘one size fits all’ model provided by MNOs. This would enable the adoption of new technologies by industry to support IoT, ITS, smart cities, smart utility applications and other Industry 4.0 opportunities. The end result of this would be greater economic outputs and an increase to Australia’s competitiveness in the global marketplace.

Under the restricted cell model of Options 2 and 3, interference into NBN Co services and adjacent band spectrum licences would be minimised and simpler to manage. This is due to the lower power of services and typical location of devices below the clutter (i.e., trees and buildings) or indoors, all of which reduce the impact of interference due to ducting as well. Some respondents commented that the proposed arrangements for Option 3 could be implemented in such a way that there was minimal or no interference to other localised WBB operators. As an example, it was highlighted that similar arrangements are in place, or planned to be put in place in mid-band spectrum, in the United States of America, Canada, parts of Europe and parts of Asia.

The ACMA had not placed sufficient weight on the disadvantages associated with a macro-cell option. These include:

The increased interference risk to NBN Co services and resulting detriment of their end users. With a combination of NBN Co, retail providers and the ACMA all having limited resources and capacity to track down and manage interference, it was felt that anything other than the restricted-cell solution was fraught with operational risks.

The limited ability of a macro cell model to cater for multiple wide-area WBB operators. This is because 60 MHz is the minimum usable amount of spectrum from an MNO perspective, and more is generally preferred. Given the amount of spectrum available in the 3400–3475 MHz band, it would only be useful for one operator.

***Support for a macro cell model***

Mobile industry submissions generally supported the ACMA assessment of Option 4 against the desirable planning outcomes. They indicated support for Option 4, provided Option 2 is implemented in the upper 15 MHz. Option 1 was stated as a second preference. Mobile industry submissions also indicated that they would not oppose the ‘no change’ option as it would enable the ACMA and potential licensees more time to wait for interference management techniques to advance to a point where macro cell deployments are more easily achieved. Mobile industry submissions were strongly opposed to Option 3 and the lack of support for macro-cell deployments made Option 2 undesirable.

Reasons given for their preferred option were:

* Mid-band spectrum is scarce, and hence valuable. Due to its scarcity, it is vital the technical configuration is optimised to serve the greatest population with the greatest potential benefit. For this reason, the ACMA should avoid mixing use cases (e.g., fixed WBB, mobile WBB, localised WBB deployments) in high demand areas. This can lead to greater spectrum denial and under-utilisation (e.g., due to the need for guard space, lower power, antenna pointing restrictions and synchronisation) when managing interference. It has the potential to deny access over a large area, rendering spectrum in a highly valuable area useless. To avoid this issue, licence areas should be predefined to cover an entire urban excise area.

There is a preference for the use of spectrum licences in urban areas, as longer licence duration brings certainty to investment enabling the spectrum to achieve its highest value use. Also, if there is a need for a future restack to consolidate spectrum holdings, a single licence type across the 3400–3800 MHz band would better facilitate this.

Over time, technology will evolve to better manage interference. Consequently, arrangements should be put in place now that support macro station deployments (even if it is not technically feasible today). This will provide flexibility in the use of the spectrum and avoid having to revisit technical conditions in the future to enable it.

Telstra argued that the ACMA’s assessment of the options did not consider demand for access to the 3400–3475 MHz band by localised WBB operators. Telstra acknowledged it was not able to have visibility of such demand, but suggested Option 3 should not be considered, in the absence of demonstrated proof or demand from such users.

***Preliminary ACMA response***

We note there are different views on which option to implement in urban excise areas, with support for restricted cell and macro cell options provided as well as one submission that did not support the use of urban excise areas for WBB services. After assessing submissions, we have identified strong support for implementing either Option 3 or Option 4.

In relation to the submission that did not support the use of urban excise areas for WBB services, the ACMA has previously consulted on this issue as part of the [3400–3575 MHz optimisation process](https://www.acma.gov.au/consultations/2019-08/optimising-3400-3575-mhz-band-consultation-122019). The outcomes of this process identified making the urban excise areas available for WBB use. We do not intend to revisit this decision.

We acknowledge the concerns raised by the mobile industry sector regarding adoption of a restricted cell option. This includes the potential complexity in creating arrangements to support localised WBB use under Option 3 as well as the potential benefits of having a single licence type in regional and metropolitan areas across the 3400–3800 MHz band.

We note comments made regarding the management of interference with NBN Co services and adjacent band spectrum licensees. We also acknowledge comments made regarding the desire for spectrum to support private WBB use cases in urban areas and the benefits associated with this. As detailed in our response to the desirable planning outcomes, we have made spectrum available for private WBB use in numerous bands and are working to make more spectrum available. We recognise options for use of urban excise areas and the broader 3400-4000 MHz band presents an additional opportunity here.

Based on submissions, we believe that Options 3 and 4 should be considered further for implementation in urban excise areas. Issues raised by respondents will be considered by the ACMA when re-assessing these options against the desirable planning outcomes.

### Feedback on preliminary interference management criteria

Several submissions provided feedback on the preliminary interference management criteria provided in the options paper. Discussion of the key issues raised appears below.

As an overarching comment, mobile industry submissions suggested that planning guidelines should be created for the broader 3400–4000 MHz band to show where the ACMA believes different use cases should reside. Technical parameters could then be optimised based on these groupings.

***Macro cell model***

NBN Co identified its preferred approach for the interference management criteria if a macro cell model was implemented. The key points raised were:

NBN Co supported implementing a secondary fallback synchronisation scheme to manage interference caused by ducting. They argued they are uniquely impacted by ducting, as they do not have any frequency division duplex layers to rely on during such events.

NBN Co indicated that they may be required to register base stations on the RRL at new sites or increase frequency reuse to meet increasing capacity demands in the future. Further analysis of proposed options is required to ensure that NBN Co are afforded sufficient flexibility to do this.

There was support for measures to enable NBN Co to adopt new technologies, provided reasonable restrictions are applied. Due to the proximity of services to urban excise areas, it would be prohibitive to pursue any options other than Option A in Table 10 of the options paper). This option places a condition on urban excise licences so that operators cannot claim protection from interference caused by base stations associated with the delivery of the NBN.

There was support for protecting NBN Co customer premise equipment (CPE) in areas adjacent to urban excise areas and applying a condition that CPEs are not deemed to cause interference into urban excise areas (as detailed in Option B in Table 10 of the options paper). This minimises any risk to services provided.

Mobile industry submissions identified their preferred approach for the interference management criteria. Some of the key points were:

There was support for retention of the existing fallback synchronisation requirement used in 3.4 GHz spectrum licences. However, there was strong opposition to the adoption of a secondary fallback synchronisation scheme as a measure to assist with ducting interference events. It was argued that this would be inefficient to solve relatively rare interference scenarios caused by ducting. It would also be difficult to identify what devices or transmitters are causing the interference. This would mean all transmitters in a defined area would have to implement the secondary fallback scheme resulting in a significant reduction in network capacity. Also, given ducting events are transient in nature (several hours to possibly several days), time will be needed to communicate with affected licensees and then plan and implement changes (it was noted that this requires each affected base station to be restarted). By the time these steps are completed it is likely the ducting event has changed or dissipated. Lastly, the secondary fallback scheme does not guarantee the elimination of interference beyond the 190 km guard interval distance.

There was support for the use of restricted use bands (RBs) as they provide better protection for 5G networks operating above 3475 MHz. There was support for the ACMA’s proposed definition of RBs which refers to a defined frequency range where either no operation is permitted or where operation is only permitted under certain conditions (e.g., agreement between operators). It was also suggested that if an adjacent frequency spectrum licensee obtains spectrum encompassed by an RB, there should be flexibility to support seamless operation of services within those spectrum licence holdings.

It was clarified that base station (BS) to BS interference would be managed via use of the current synchronisation requirement on 3.4 GHz spectrum licences.

It is understood that one of the 2 proposed BS to CPE/mobile station (MS) interference criteria (detailed at Appendix E of the options paper) would replace the existing spectrum licence device boundary criteria (DBC) for the management of interference to and from urban excise areas in the 3400–3475 MHz band. Mobile industry submissions identified they have not agreed on a preference for the power flux density (PFD) or C/(N+I)[[14]](#footnote-15) criteria or associated parameters, though it is proposed to use single entry assessment if a PFD approach is used. The complexity and challenges in performing the proposed calculations for each new device registration were identified. It was noted that there would be difficulties in registering transmitters in the RRL in urban excise areas to satisfy these requirements. Also, it is possible that the more complex BS-CPE/MS criteria would be more restrictive than the current spectrum licence DBC.

It was agreed that no specific coordination requirements are required for interference between user equipment.

There was support for protecting NBN Co CPE in areas adjacent to urban excise areas, and applying a condition that they are not deemed to cause interference into urban excise areas. However, it was felt that reciprocal arrangements should apply to fixed CPEs inside urban excise areas. This is so there is equality in the arrangements that apply. It was also stated that such conditions should only apply to the management of interference to and from urban excise areas and be limited to the 3400–3475 MHz band.

There was support for measures to enable NBN Co to adopt new technologies provided reasonable restrictions are applied (as detailed in Option B in Table 10 of the options paper).

It was suggested that NBN Co service areas, where CPEs are protected, need to be defined more precisely. The areas should be defined to only encompass premises, or serviceable areas, where NBN Co is required to provide fixed wireless services with the addition of a small buffer (e.g., 100 metres). This ensures erroneous areas, such as vacant land, forests or other uninhabited places, are not included.

More details on the views and proposals made by mobile industry submissions on this issue can be found in the AMTA, Optus and Telstra submissions.

***Restricted cell model***

NBN Co stated a preference for the proposed interference management criteria relating to Options 2 and 3. It argued these were simpler and would avoid many of the complexities the ACMA is trying to address regarding the development of interference criteria for the macro cell model.

Private WBB submissions raised the following points regarding the preliminary interference management criteria:

Numerous submissions commented that the criteria proposed were reasonable. They believed that appropriate measures could be put in place to manage interference between multiple private WBB operators under Option 3.

One submission suggested only time division duplex (TDD) systems should be supported, to minimise interference and maximise efficient use of spectrum. Also, TDD synchronization/timing and a common flexible/configurable frame structure requirement needs to be adopted.

One submission indicated it is important that unwanted emission limits be developed and/or guard bands be instituted to assist in the management of interference. It is preferable that reasonable emission limits are used so that guard bands can be avoided to maximise available spectrum. Whatever emission limits are adopted, these should not be overly stringent and not add unwanted burden in terms of filtering (for example). It is equally important to ensure that these emissions limits are not so relaxed as to contribute to interference. Another submission suggested Interference to NBN Co and adjacent band spectrum licences could be managed by ensuring licences are operated within the 3GPP guidelines.

One submission proposed additional safeguards be put in place to ensure proposed networks take reasonable technical and engineering planning into account during the application process, including: declaration and validation of devices to minimise interference, and testing to ensure neighbouring users are not adversely affected in normal operation. Regulatory mechanisms should also be adopted to arbitrate or resolve disputes between adjacent spectrum holders in case of interference, should mutual negotiation fail.

***Preliminary ACMA response***

We note the views and proposals concerning the preliminary interference management criteria. These will be considered in the further development of these criteria under the final option adopted for use in urban excise areas. We further confirm that support for TDD systems only is envisioned for urban excise areas.

The ACMA plans to further consult on proposed interference management criteria before they are finalised.

Part of this work will consider appropriate unwanted emission limits for WBB services. We acknowledge that these are one mechanism that can be used to manage adjacent channel interference between different urban excise licensees, but they are not the only or necessarily the most appropriate one. We note that relying on unwanted emission limits alone to manage adjacent channel interference would likely require the use of restricted use bands. The stricter the limits, the smaller the size of any restricted use bands and vice versa. If multiple operators gain access to an urban excise area this would further reduce the utility of the already limited amount of spectrum available. There may also be difficulties in implementing some limits in active antenna systems. It will be challenging finding the appropriate balance for unwanted emission limits and guard/restricted use bands.

We consider that adopting a restricted use band is appropriate for managing interference with services deployed under existing adjacent channel spectrum licences. However, the ACMA’s current preference is to use a synchronisation fallback scheme to manage adjacent channel interference between urban excise licensees. This reduces the need for restricted use bands and enables licensees to investigate alternative measures if practical and/or agreed with relevant licensees. If this is not possible, then there is a clear mechanism (i.e., synchronise using a defined frame structure) that licensees must adopt to manage any interference.

### Other issues raised

Aqura Technologies stated there are entities holding tactical spectrum holdings in various WBB bands for competitive gain, who are restricting the ability of end-user organisations to create and operate their own private networks and the opportunities this can provide. Consequently, they requested that further criteria be used for apparatus licence applications to manage this. They suggested the right to apply for an apparatus licence should be based on ownership of the property or area or the ability to use the property or area. Also, when granted a licence, the licensee, should within a reasonable amount of time, be transmitting on the licenced channel or the licence becomes invalid.

Mobile industry submissions provided additional comments relating to the allocation of licences in urban excise areas, as follows:

There was support for combining the allocation of spectrum under Options 1,2 and 4 with allocation processes for spectrum in the 3700–4200 MHz band. However, if AWLs are issued, licences should be allocated after the auction of spectrum in metropolitan areas within the 3700–4200 MHz band, currently scheduled for 2023. This will help to determine whether there is indeed sufficient demand to allocate urban excise areas in 3400–3475 MHz via AWLs.

There is a preference for issuing spectrum licences in urban excise areas. This is considered the most efficient way to ensure there is price and demand discovery for spectrum across the broader 3400–3800 MHz band. If there is any spectrum available at the end of the auction it could be made available for AWLs. Furthermore, the expiry of licences issued in urban excise areas should align with licences issued in the 3700–3800 MHz band.

If Option 4 is adopted (with Option 2 in the upper 15 MHz) and a spectrum licence approach is taken, to minimise the number of potential adjacent-frequency boundary issues in the urban excise spectrum space, it was recommended that the RBs not be made available in isolation. Rather, the upper 15 MHz of the band should be bundled together as a single product. Telstra also suggested that if such an approach is not taken, then their preference would be to not allocate the RBs.

While a minimum contiguous bandwidth (MCB) for the issue of licences was not canvassed in the options paper, Telstra argued it does have a linkage to the technical arrangements. It proposed a 10 MHz MCB be considered to reduce the risk of band fragmentation and possible need for more guard bands.

As the allocation process can affect how technical matters could or should be considered, it was suggested TLGs should include discussion of that process.

***Preliminary ACMA response***

The ACMA notes comments received regarding the allocation of licences in urban excise areas. These will be considered further in the development and consultation of allocation arrangements. Where it makes sense to do so, the ACMA will combine this work with similar work being conducted to release spectrum in the broader 3400–4000 MHz band.

The ACMA is currently working on multiple planning and allocation processes for spectrum licences and AWLs in the 3400–4000 MHz band. We aim to finalise these in 2022. For the sequencing of allocation processes, the ACMA currently plans to allocate AWLs in remote areas first. This will then be followed by the allocation of spectrum licences then AWLs in metropolitan and regional areas.

We acknowledge comments made regarding the inclusion of allocation issues in TLGs. These will be considered in our reassessment of Options 3 and 4. To ensure the best long-term outcomes are adopted, these will also be considered in the context of work that is currently underway to develop planning and allocation arrangements for WBB use across the broader 3400–4000 MHz band. Refer to the Planning outcomes section below for further information.

# Planning outcomes

This section presents planning decisions made regarding amendments to the 3.4 GHz technical framework and provides an update on our consideration of options for the use of urban excise areas.

The [Next steps](#_Next_steps)section provides indicative timeframes for the implementation of amendments to the 3.4 GHz technical framework and further consideration on the use of urban excise areas.

## Planning decisions

### 3.4 GHz technical framework

Submissions to the option paper were supportive of the proposed amendments to the 3.4 GHz technical framework. There were also some additional proposed changes to the draft Radiocommunications (Unacceptable Levels of Interference – 3.4 GHz Band) Amendment Determination 2021 (No. 1) as detailed in the [Discussion of submissions](#_Discussion_of_submissions) section.

After reviewing submissions, the ACMA has made the following planning decisions regarding amendments to the 3.4 GHz technical framework:

The s.145(4) Determination: Implement the changes proposed in the draft Radiocommunications (Unacceptable Levels of Interference – 3.4 GHz Band) Amendment Determination 2021 (No. 1) with the following amendments as detailed in the [Discussion of submissions](#_Discussion_of_submissions) section:

retain existing subsection 9(2) of the s.145(4) Determination and move the clause proposed to replace it to a new subsection 9(5)

include additional measures to expand the grandfathering clause in the proposed new section 11 to allow minor modifications to be made to radiocommunications devices. To address concerns raised, we will include a statement that requires the details of a device be updated in the RRL to reflect any changes.

Receiver spurious emission limits: Implement the changes as proposed in the options paper.

RALI MS44: Implement the changes as proposed in the options paper. The ACMA notes that the draft RALI MS44, at Appendix C to the options paper, incorrectly identified the additional frequency ranges for defined ESPZs would be 3400–3425 MHz and 3492.5–3542.5 MHz. The correct frequency ranges were detailed in the body of the options paper. These are the 3400–3442.5 MHz and 3475–3542.5 MHz bands, which also reflects what was discussed and agreed within the 3.4 GHz TLG. These frequencies represent the portions of the band not currently subject to spectrum licensing in the Moree, Roma and Uralla ESPZs.

Based on comments received and previous support within the TLG, we do not expect any issues with adopting the 3400–3442.5 MHz and 3475–3542.5 MHz frequency ranges.

## Update on urban excise work

As detailed in the [Discussion of submissions](#_Discussion_of_submissions)section, views on the preferred option for use of urban excise areas were polarised.[[15]](#footnote-16) They are grouped as follows:

NBN Co and private WBB submissions primarily supported Option 3, though there was some support for Option 2 as well. While most submissions opposed Options 1 and 4, a few indicated support for Option 4 if equivalent spectrum is not made available in the 3800–4000 MHz band.

Mobile industry submissions primarily supported Option 4 (implementing Option 2 in the upper 15 MHz). They had a secondary preference for Option 1. There was strong opposition to implementing Option 3.

One confidential submission did not support WBB services being deployed using the 3400–3475 MHz band in urban excise areas.

Several submissions also linked outcomes in urban excise areas to the work underway to develop arrangements for WBB across the broader 3400–4000 MHz band. It was suggested that planning guidelines should be created considering the entire 3400–4000 MHz band to show where the ACMA believes different use cases should reside. This would allow technical arrangements to be developed and optimised based on these groupings.

Current planning arrangements for the 3400–4000 MHz band are detailed in Figure 3. These include arrangements for WBB use under both spectrum licensing and AWLs (supporting WBB) in different segments of the band.

1. Planning arrangements for the 3400–4000 MHz band

**AM = amateur services, AWL = area-wide licence, ESPZ = earth station protection zone,**

**FSS = fixed satellite service, PMP = point-to-multipoint services, PTP = point-to-point services,**

**SL = spectrum licence**

Figure 3: Planning arrangements for the 3400–4000 MHz band 

The ACMA acknowledges the submission that did not support use of urban excise areas for WBB services. However, we have previously consulted on this issue as part of the [3400–3575 MHz optimisation process](https://www.acma.gov.au/consultations/2019-08/optimising-3400-3575-mhz-band-consultation-122019). The outcomes of this process identified making the urban excise areas available for WBB use.

After reviewing submissions, we believe that Options 3 and 4 should be considered further for implementation in urban excise areas. We will reassess both these options, taking into account relevant feedback. To ensure the best long-term outcomes are adopted, these will also be considered in the context of work that is underway to develop planning and allocation arrangements for WBB use across the broader   
3400–4000 MHz band.

We are working on multiple planning and allocation processes for spectrum licences and AWLs in the 3400–4000 MHz band. However, time is required to progress these so that the role urban excise areas will play in achieving our objectives can be better understood. This includes how different WBB use cases can be accommodated within the 3400-4000 MHz band, as this may result in more efficient use of spectrum.

Submissions confirmed the previously identified 3 use cases that warrant further consideration, being:

Wide area WBB (WA WBB) uses: This use case encompasses NBN Co and mobile network operators and is typically supported via the issue of spectrum licences covering large geographical areas.

Macro cell local area WBB (LA WBB) uses: This use case encompasses the deployment of a limited number of WBB services requiring a medium to large cell size, as is often seen for services delivered by wireless internet service providers and above ground mine sites. This use case is typically best supported by the issue of apparatus licences such as AWLs that enable operation within a desired service area or areas.

Restricted cell LA WBB uses: This use case encompasses highly localised private and enterprise networks, including services at warehouses, factories, airports, ports, transport hubs, hospitals, schools and smart buildings. This use case is typically best supported by class licence or apparatus licence (such as AWL) arrangements that enable operation within a highly localised service area or areas. While it is possible for AWL arrangements to support both the macro cell and restricted cell LA WBB cases, there may be efficiencies in identifying dedicated spectrum for each of these cases.

In February 2022, we plan to consult on the re-allocation of spectrum in the   
3400–3800 MHz band for the issue of spectrum licensing pursuant to section 153B of the Act. We intend to provide additional explanation of the broader   
3400–4000 MHz band planning and allocation issues, including the purpose for which urban excise spectrum may be used. We also plan to conduct a [spectrum tune-up](https://www.acma.gov.au/spectrum-tune-ups) on 3400–4000 MHz band related issues in Q2 2022. This will provide an opportunity for the ACMA to workshop its ideas. Consequentially, we aim to decide on the use of urban excise areas in mid-2022.

By combining further discussion on this issue with the s.153B consultation, the ACMA is seeking to reduce the number of separate consultation processes that stakeholders need to consider and to expose some of the broader issues for consideration in the 3400–4000 MHz band. It does not mean the ACMA has made a decision to issue spectrum licences in urban excise areas.

Once a decision has been made, we will commence implementation, which will include finalising interference management criteria, developing administrative policy guidance (such as Radiocommunications Assignment and Licensing Instructions (RALIs)) and making/updating relevant legislative instruments. Where appropriate, any work will be combined with similar work being conducted to implement the [*Replanning the 3700–4200 MHz band – Outcomes paper*](https://www.acma.gov.au/consultations/2020-07/planning-options-3700-4200-mhz-band-consultation-222020).

# Next steps

This section provides an overview of the next steps the ACMA will take to implement amendments to the 3.4 GHz technical framework and progress consideration on the use of urban excise areas.

### 3.4 GHz technical framework

We have now made the Radiocommunications (Unacceptable Levels of Interference – 3.4 GHz Band) Amendment Determination 2021 (No. 1) and published updates to [RALI MS44](https://www.acma.gov.au/publications/2019-08/instruction/frequency-coordination-procedures-earth-station-protection-zones).

To give effect to the proposed changes to receiver spurious emission limits, we will write to all 3.4 GHz band spectrum licensees seeking their agreement to amend relevant conditions on their licences. As this relates to a change in core conditions, the changes will only be made on a licence-by-licence basis if there is agreement from licensees in accordance with section 72 of the Act. We aim to commence this process in December 2021.

### Use of the 3400-3475 MHz band in urban excise areas

To progress consideration on the use of urban excise areas, the ACMA has developed the indicative timetable set out in Table 2. The table shows the activities we plan to undertake and their estimated timing following the release of this paper. Completion of these activities is contingent on a variety of factors, including feedback received from stakeholders and consideration by the ACMA. Timeframes are indicative and intended to provide a guide to the sequencing and commencement of particular streams of work.

Indicative timetable for finalising work

|  |  |  |
| --- | --- | --- |
| Step | Step detail | Completion date |
| Public consultation | Consultation on:  draft spectrum re-allocation declaration (under section 153B of the Act) to support the issue of spectrum licences in defined parts of the  3400–3800 MHz band  further consideration on the use of urban excise areas in context of the broader  3400–4000 MHz band. | February 2022 |
| Spectrum tune-up | ACMA-run event to discuss  3400–4000 MHz band related issues. | Q2 2022 |
| Announce outcomes of public consultation | Release an outcomes paper for the February 2022 consultation process. This will include a decision on the use of urban excise areas in the context of the broader 3400–4000 MHz band. | June 2022 |
| Consult on final regulatory arrangements for spectrum use in urban excise areas | Following a decision on the use of urban excise areas, we will formally consult on regulatory arrangements necessary to enable access to spectrum in urban excise areas. Where it makes sense to do so, we will combine any such consultation with that necessary for implementing arrangements in the 3400–4000 MHz band. | Q3 2022 |
| Release of spectrum in urban excise areas | Timeframes depend on the option implemented, licence type used, and allocation method adopted. Any outcome that uses AWLs or spectrum licences is proposed to be combined with allocation processes for similar licences in the broader 3400–4000 MHz band. | Q4 2022 to Q4 2023 |

# Appendix A: Geographical area description

The geographical areas covered by urban excise areas are:

Described in the Table 3.

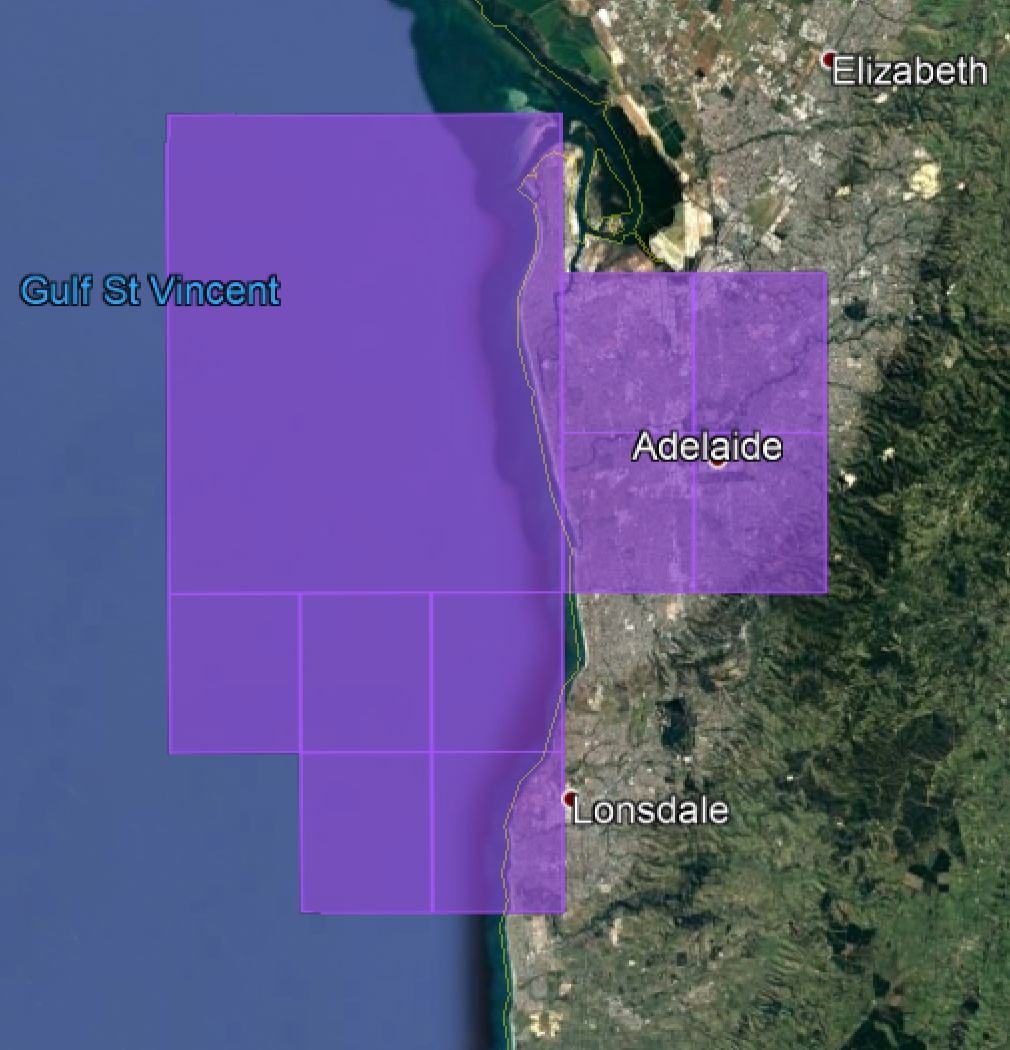
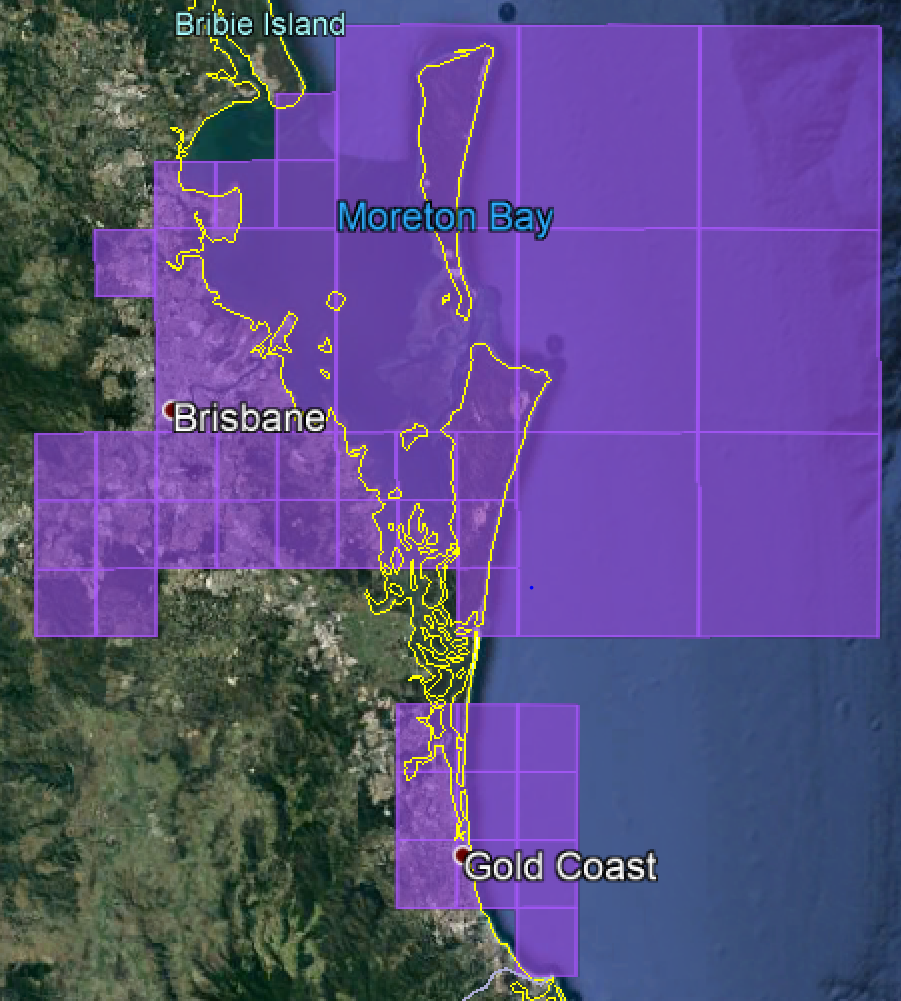
Illustrated in Figure 4.

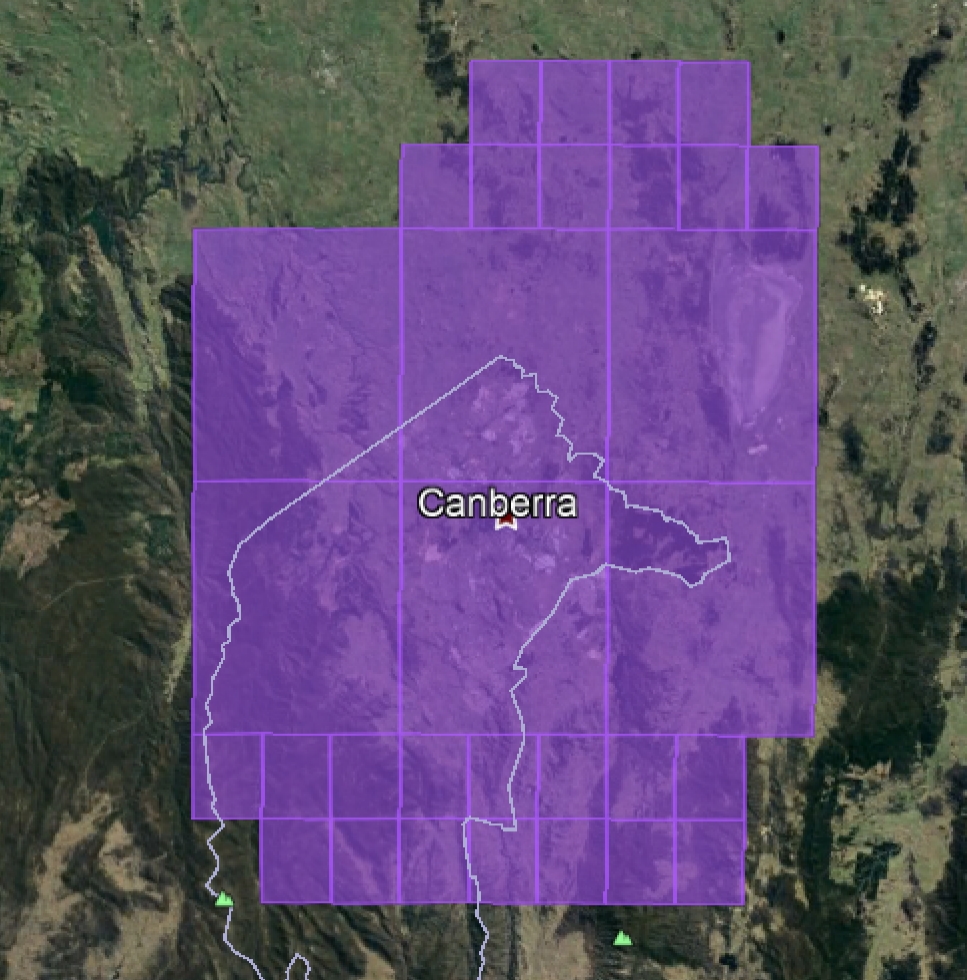
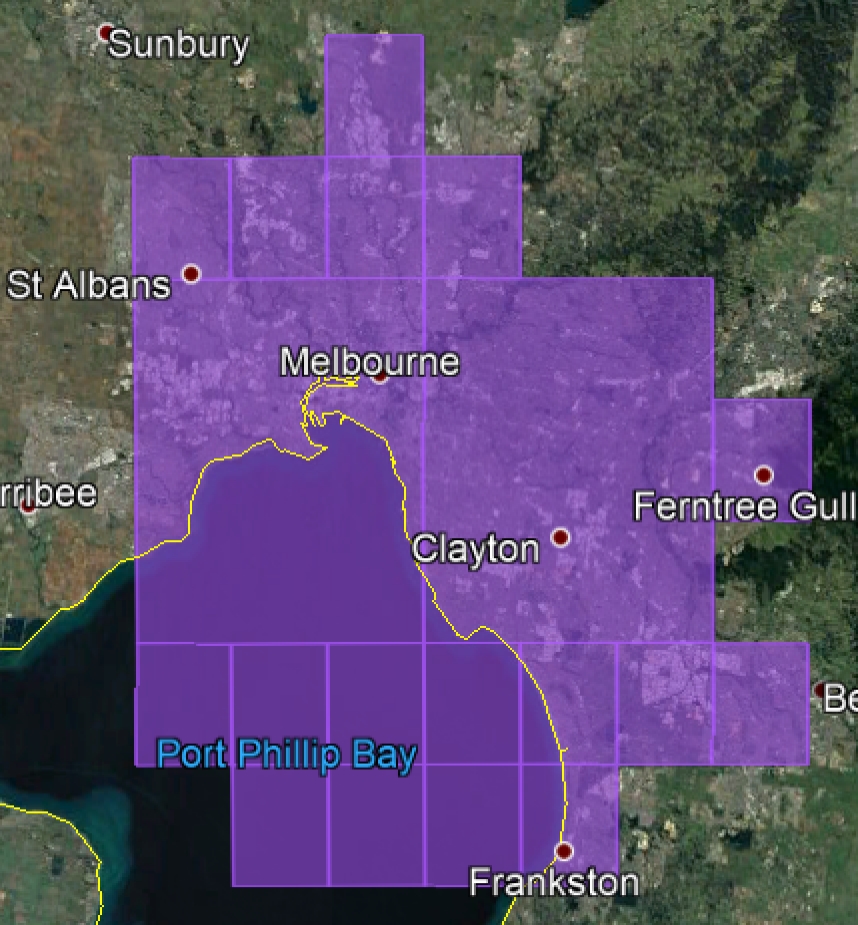
HCIS description of urban excise areas

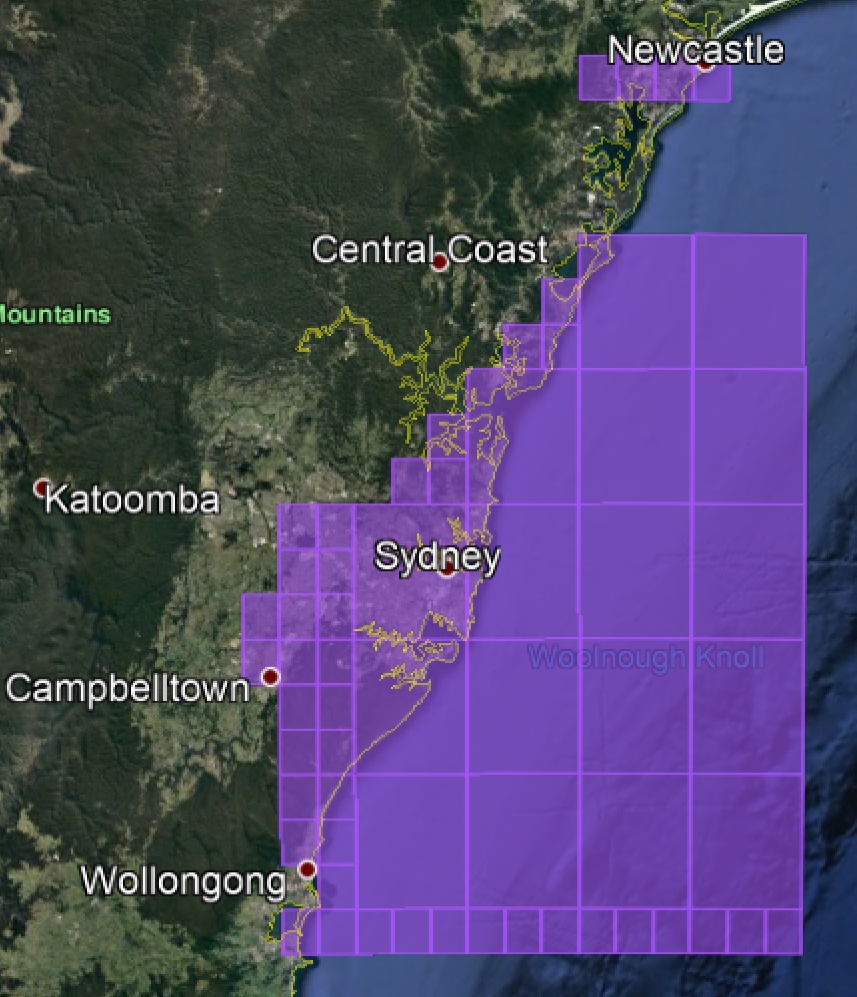
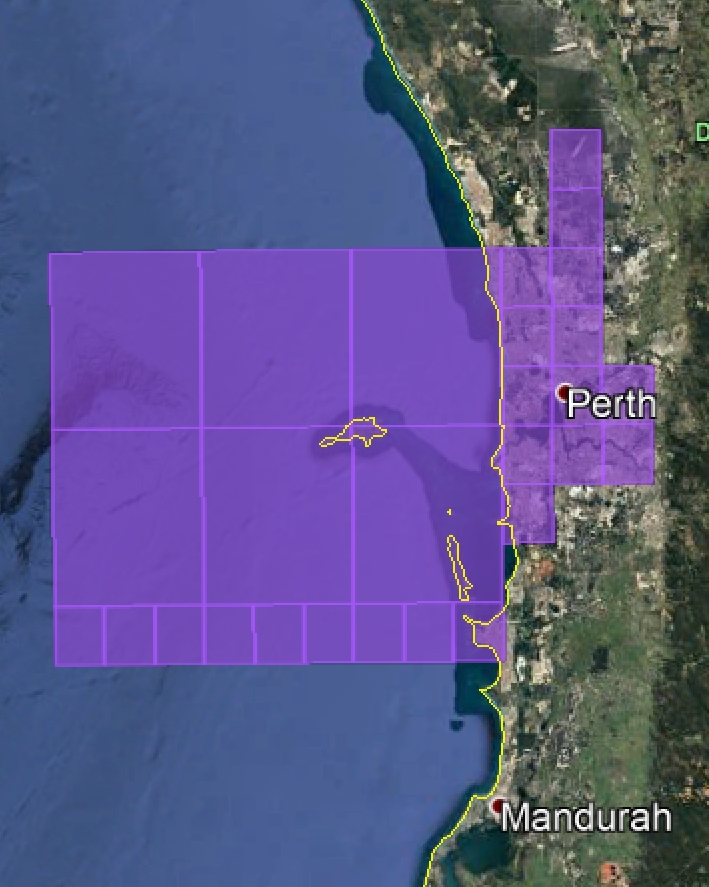
| Sub-area name | HCIS |
| --- | --- |
| Adelaide | IW3N, IW3O4, IW3O5, IW3O7, IW3O8, IW6B1, IW6B2, IW6B3, IW6B5, IW6B6 |
| Brisbane | NT9B, NT9C, NT9D, NT9E, NT9F, NT9G, NT9H, NT9K, NT9L, NT8H3, NT8L2, NT8L3, NT8L5, NT8L6, NT8L8, NT8L9, NT9A6, NT9A7, NT9A8, NT9A9, NT9I1, NT9I2, NT9I3, NT9I4, NT9I5, NT9I6, NT9J1, NT9J2, NT9J3, NT9J4, NT9J5, NT9J6, NT9J9, NT9N5, NT9N6, NT9N8, NT9N9, NT9O4, NT9O7, NU3B2, NU3B3, NU3C1, NU3C4 |
| Canberra | MW4D, MW4H, MW5A, MW5B, MW5E, MW5F, MW2M5, MW2M6, MW2M7, MW2M8, MW2M9, MW2N4, MW2N5, MW2N7, MW2N8, MW2N9, MW4L1, MW4L2, MW4L3, MW4L5, MW4L6, MW5I1, MW5I2, MW5I3, MW5I4, MW5I5, MW5I6, MW5J1, MW5J2, MW5J4, MW5J5 |
| Melbourne | KX3P, KX3L6, KX3L7, KX3L8, KX3L9, KX6D1, KX6D2, KX6D3, KX6D5, KX6D6, LX1M, LX1I7, LX1N4, LX4A1, LX4A2, LX4A3, LX4A4, LX4A5, LX4B1 |
| Perth | BV1M, BV1N, BV1O, BV4A, BV4B, BV4C, BV1L5, BV1L8, BV1P1, BV1P2, BV1P4, BV1P5, BV1P7, BV1P8, BV4D1, BV4D2, BV4E1, BV4E2, BV4E3, BV4F1, BV4F2, BV4F3, BV4G1, BV4G2, BV1P9, BV4D3, BV4D4, BV4G3 |
| Sydney | NV7G, NV7H, NV7J, NV7K, NV7L, NV7M, NV7N, NV7O, NV7P, NW1A, NW1B, NW1C, NW1D, NW1E, NW1F, NW1G, NW1H, MV9P2, MV9P3, MV9P5, MV9P6, MV9P7, MV9P8, MV9P9, MW3D1, MW3D2, MW3D3, MW3D5, MW3D6, MW3D8, MW3D9, MW3H2, MW3H3, MW3H5, MW3H6, MW3H9, MW3L2, MW3L3, NV4O7, NV4O8, NV4O9, NV4P7, NV7F6, NV7F8, NV7F9, NV7I6, NV7I8, NV7I9, NW1I1, NW1I2, NW1I3, NW1J1, NW1J2, NW1J3, NW1K1, NW1K2, NW1K3, NW1L1, NW1L2, NW1L3 |

The HCIS coordinates can be converted into a Placemark file (viewable in Google Earth) through a facility on the [ACMA website](https://acma.gov.au/convert-hcis-area-description-placemark-0).

1. Illustration of urban excise areas (purple areas)

# Appendix B: Options for use of urban excise areas

In the options paper, we identified 4 options for making urban excise areas available for wireless broadband uses. These are reproduced in Table 4.

The options paper also acknowledged that there is an option for ‘no change’. Under this option, use of spectrum in urban excise areas could be re-assessed as equipment capabilities evolve, which may change the technical coexistence considerations. However, while this could enable macro cell deployments, it was considered that this outcome was adequately covered by Options 1 and 4.

Options for use of spectrum in urban excise areas

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Option | Technical model | Access model | Licence model | Description |
| Option 1 | Macro cell | Single operator per frequency segment across entire urban excise area | Spectrum licence or area wide licence (AWL) | Under this option, a single operator would take out a licence in each urban excise area for a given frequency range (segment). Multiple operators could be supported in different segments of the 3400–3475 MHz frequency range. To manage interference between different licensees, relevant co-channel and adjacent channel boundary conditions would be implemented. This may limit service deployments to small cells initially. Macro-cell deployments may be possible in the future as equipment capabilities evolve. |
| Option 2 | Restricted cell | Single operator per frequency segment across entire urban excise area | Spectrum licence or AWL | Under this option, a single operator would take out a licence in each urban excise area for a given frequency range (segment). Multiple operators could be supported in different segments of the 3400–3475 MHz frequency range. To manage interference between different licensees, relevant co-channel and adjacent channel boundary conditions would be implemented. This includes deployment restrictions such as a low radiated power limit and low outdoor antenna heights (i.e., effectively small cell operation) and other possible restrictions. |
| Option 3 | Restricted cell | Multiple operators across entire urban excise area – either within excusive frequency segment or shared | Apparatus licence (possibly AWL) or class licence | Under this option, multiple operators could share access to the same frequency in an urban excise area and/or by operating in different segments of the 3400–3475 MHz frequency range. To manage interference between different licensees, relevant co-channel and adjacent channel boundary conditions would be implemented. This includes deployment restrictions such as a low radiated power limit and low outdoor antenna heights (i.e., effectively small cell operation) and other possible restrictions. |
| Option 4 | 3400–3460 MHz  macro cell  3460–3475 MHz  restricted cell | 3400–3460 MHz: Single operator per frequency segment across entire urban excise area  3460–3475 MHz:  Depends on which of Options 2 or 3 is adopted | 3400–3460 MHz  spectrum licence or AWL  3460–3475 MHz  spectrum licence, AWL or class licence | Under this option, any combination of Options 1, 2 or 3 could be implemented in different segments of the 3400–3475 MHz frequency range. The ACMA propose the best combination would be Option 1 and Option 2 or 3 being implemented in the 3400–3460 MHz and  3460–3475 MHz segments respectively. |

# Appendix C: List of consultation respondents

The ACMA consulted on [*Planning for wireless broadband use of urban areas in the 3400-3475 MHz band: Options paper*](https://www.acma.gov.au/consultations/2021-08/planning-wireless-broadband-use-urban-areas-3400-3475-mhz-band-consultation-312021) from 27 August to 30 September 2021. Fourteen submissions were received to this consultation, including one provided by a member of the public who requested anonymity and that it not be published. Submissions that did not seek anonymity were received from:

Aqura Technologies

The Australian Critical Communications Forum (ACCF)

The Australian Mobile Telecommunications Association (AMTA)

The Australian Radio Communications Industry Association (ARCIA)

Cambium Networks

DAMM Australia

DB Telecommunications

Lockheed Martin – Australia Pty Ltd (LMA)

NBN Co

Optus

RF Industries Pty Ltd (RFI)

Simoco Wireless Solutions (SWS)

Telstra.

Public submissions can be accessed at the ACMA’s [*Planning for wireless broadband use of urban areas in the 3400–3475 MHz band*](https://www.acma.gov.au/consultations/2021-08/planning-wireless-broadband-use-urban-areas-3400-3475-mhz-band-consultation-312021) webpage.

1. A macro-cell refers to a base station within a mobile network that provides radio coverage to user terminals over a large area. They are characterised by transmitters with high power and high gain antennas with antennas mounted on towers, masts, roof-tops and other existing structures to support wide-area coverage. [↑](#footnote-ref-2)
2. A restricted cell is considered to be a base station that has some form of restrictions on its operation that limits or reduces the size of the radio coverage to user terminals (e.g., limits on radiated power and antenna heights). It encompasses terms such as micro-cells, small cells, femtocells, etc. [↑](#footnote-ref-3)
3. The options for use of urban excise areas presented in the options paper have been reproduced at [Appendix B](#_Appendix_B:_Options). [↑](#footnote-ref-4)
4. The associated urban excise areas are defined in [Appendix A](#_Appendix_A:_Geographical). [↑](#footnote-ref-5)
5. ACMA [*Corporate plan 2020–21*](https://www.acma.gov.au/publications/2020-08/report/corporate-plan-2020-21). [↑](#footnote-ref-6)
6. [Radiocommunications (Spectrum Designation—3.4 GHz Band) Notice 2020](https://www.legislation.gov.au/Details/F2020L01661). [↑](#footnote-ref-7)
7. Technical conditions include maximum power, frequency range, out-of-band emissions limits, geographical licence area, and out-of-area emission limits. [↑](#footnote-ref-8)
8. In the context of this paper, a restricted use band refers to a defined frequency range where either no operation is permitted, or operation is only permitted under certain conditions (e.g., agreement between operators). [↑](#footnote-ref-9)
9. Existing subsection 9(2) states that device boundary criteria (DBC) failures that do not cross another spectrum licence and fall outside the Australian Spectrum Map Grid, are not deemed to cause unacceptable levels of interference. [↑](#footnote-ref-10)
10. Existing subsection 9(4) states that DBC failures that only occur over ocean paths (except specific parts of Bass Strait and St Vincent Gulf) are not deemed to cause unacceptable levels of interference. [↑](#footnote-ref-11)
11. The grandfathering clause states that device registrations are required to meet the requirements of the s.145(4) Determination that applied at the time of registration. It ensures existing device registrations are not affected by any future changes to the s.145(4) Determination. [↑](#footnote-ref-12)
12. Submissions grouped under the term ‘private WBB submissions’ include: the Australian Critical Communications Forum (ACCF), Aqura Technologies, the Australian Radio Communications Industry Association (ARCIA), Cambium Networks, DAMM Australia, DB Telecommunications, RF Industries Pty Ltd (RFI) and Simoco Wireless Solutions (SWS). [↑](#footnote-ref-13)
13. Industry 4.0 or the fourth industrial revolution refers to the transformation of how businesses operate by connecting the physical with the digital world. Artificial intelligence, advanced automation and robotics are examples of Industry 4.0 technologies. [↑](#footnote-ref-14)
14. Carrier to noise plus interference ratio. [↑](#footnote-ref-15)
15. For convenience, the options for use of urban excise areas presented in the options paper have been reproduced at [Appendix B](#_Appendix_B:_Options). [↑](#footnote-ref-16)