

Optimising arrangements for the 3400–3575 MHz band

Planning decisions and preliminary views

NOVEMBER 2019

Canberra

Red Building
Benjamin Offices
Chan Street
Belconnen ACT

PO Box 78
Belconnen ACT 2616

T +61 2 6219 5555
F +61 2 6219 5353

Melbourne

Level 32
Melbourne Central Tower
360 Elizabeth Street
Melbourne VIC

PO Box 13112
Law Courts
Melbourne VIC 8010

T +61 3 9963 6800
F +61 3 9963 6899

Sydney

Level 5
The Bay Centre
65 Pirrama Road
Pyrmont NSW

PO Box Q500
Queen Victoria Building
NSW 1230

T +61 2 9334 7700 or 1800 226 667
F +61 2 9334 7799

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Written enquiries may be sent to:

Manager, Editorial Services
PO Box 13112
Law Courts
Melbourne VIC 8010
Email: info@acma.gov.au

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Executive summary

The 3400–3575 MHz band forms part of the 3300–3800 MHz band that has been identified globally for wireless broadband use (including 5G). Consequently, there has been increasing interest in deploying such services in the band.

Mid-band spectrum between 1 and 6 GHz is currently the focus of near-term 5G deployments. Stakeholder engagement in the lead-up to the 3.6 GHz band auction in 2018 identified optimising spectrum and apparatus licence arrangements in the adjacent 3400–3575 MHz band as an activity that should be prioritised in the ACMA's work program. In the *Five-year spectrum outlook 2019–23* (FYSO 2019–23) we identified major opportunities for efficiency gains through the defragmentation of the current 3400–3575 MHz frequency range.

Consolidating the different licence arrangements for wireless broadband use (referred to as 'defragmentation' or 'defrag' in this paper) is expected to result in more efficient use of spectrum and a reduction in network deployment costs. The ACMA has previously considered planning options and made proposals to address this issue. Most notably this included the release of the 2014 discussion paper, *Transitioning the 3.5 GHz band for future opportunities*. Also, as part of the reissue of 3.4 GHz spectrum licences process, the ACMA facilitated the defragmentation of spectrum holdings within the space identified for spectrum licensing.

To date, the mix of licensing types across the band has impeded commercial negotiations to defrag arrangements across the entire band. For this reason, there has been growing interest for the ACMA to intervene to facilitate defrag and make more of the band available for wireless broadband use. We consequently commenced work to identify options for change.

We identified a set of planning goals to guide the assessment of options considering changes in the licensing arrangements in the band. We also considered options for change against our [Principles for Spectrum Management](#) and the object of the *Radiocommunications Act 1992* (the Act), including maximising the overall public benefit derived from using the radiofrequency spectrum.

To inform our decision making, we released the [Optimising arrangements for the 3400–3575 MHz band: Options paper](#) (the Options paper) in April 2019. The Options paper identified the need for change and put forward three planning options for consideration. These options were intended to facilitate a defrag of spectrum and apparatus licence arrangements and make more of the band available for wireless broadband use. We sought information from stakeholders to inform consideration of a preferred planning approach.

The Options paper also started the discussion on whether and how urban areas of NBN Co's 3.5 GHz public telecommunications service (PTS) licences could be made available for use by other operators. The ACMA recognises this could make an additional 75 MHz of internationally harmonised 5G spectrum available for use in capital cities. For this reason, since reviewing submissions to the Options paper, we have worked with NBN Co to define these areas (referred to in this paper as 'urban excise areas'). The resulting areas are detailed at Appendix C.

This decision paper concludes the ACMA's review of planning arrangements for the 3400–3575 band. Key planning decisions made for the 3400–3575 band include:

- > Implementing the arrangements detailed in Option 3b of the Options paper and illustrated in Figure 1. This involves:
 - > Maintaining existing arrangements for radiolocation services and devices operating under class licences.
 - > Extending existing Earth Station Protection Zones (ESPZs) in eastern Australia to cover those parts of the band not already subject to spectrum licensing (the 3400–3442.5 MHz and 3475–3542.5 MHz frequency ranges). The ACMA also does not propose these areas and frequencies be identified for spectrum licensing.
 - > Restacking (or retuning) incumbent amateur, point-to-multipoint (PMP), NBN Co's 3.5 GHz PTS apparatus licences to achieve the new consolidated arrangements in the band. To ensure a timely restack of services, the ACMA will adopt a policy of only reissuing PMP licences in the 3425–3442.5 MHz band in regional areas on the basis they expire on or before 30 November 2020. During this time alternative spectrum in the 3475–3510 MHz band will be made available for licensees to move into. Licensees will also be free to investigate other options.
 - > Once restack is complete, and subject to a decision by the Minister for Communications, Cyber Safety and the Arts, commencing processes to convert NBN Co's 3.5 GHz PTS licences to spectrum licences. This will enable licence trades or variations to occur between NBN Co and Optus to defrag their spectrum holdings.
 - > Developing arrangements for PMP licensing in those parts of the band that are not identified for spectrum licensing. This includes:
 - > 50 MHz in major regional centres
 - > 35–67.5 MHz in regional areas
 - > 300 MHz in remote areas (when combined with existing arrangements in the 3575–3700 MHz band).PMP arrangements are expected to be of interest to localised wireless broadband operators such as wireless internet service providers (WISPs), miners and other industry verticals.
- > Excising unused urban areas of by NBN Co's 3.5 GHz PTS license and making them available for use by other wireless broadband operators (referred to in this paper as urban excise). This involves:
 - > Engaging with industry to develop interference management criteria to and from urban excise areas.
 - > Determining the utility of urban excise areas and an appropriate licensing approach to make them available.
 - > Once defrag is complete, excising urban areas from NBN Co's newly converted spectrum licences.
- > Subject to a decision to designate additional spectrum for the issue of spectrum licences by the Minister, allocating 25 MHz and 42.5 MHz of spectrum in major regional centres and defined regional areas. This may also include the allocation of urban excise areas. If it does not, these areas will be made available via other appropriate means.

The ACMA has formed the view that this combination of measures will best maximise the overall public benefit derived from use of the band, by making more of the band available for both wide-area wireless broadband (such as mobile network operators) and localised wireless broadband services.

A key benefit of these arrangements is that they minimise the impact on incumbent services. Existing spectrum and class licensed arrangements are not affected. While a number of existing apparatus-licensed services will be affected by the restack process, the final arrangements ensure they will have access to the same quantum of, or more, spectrum within the band.

Based on planning decisions made in this paper, a summary of the overall proposed configuration for the 3400–3575 band is shown in Figure 1.

Next steps

A detailed implementation plan has been developed and is outlined in Table 2 of this paper.

The ACMA recognises that some of the steps to implement these planning decisions require negotiation and commercial agreements between incumbent spectrum and apparatus licensees. This includes coordinating efforts to restack services, the creation of third-party authorisations where relevant and the trading (or variation) of spectrum licences to consolidate licence holdings. However, due to the strong support for change evident in submissions to the Options paper, the ACMA sees that there are strong incentives for incumbent licenses to participate in these activities to achieve a successful defrag of the band.

Introduction

In April 2019, the ACMA released the [Optimising arrangements for the 3400–3575 MHz band: Options paper](#). The Options paper presented a case for change in the 3400–3575 MHz band and identified planning options to:

- > facilitate a defragmentation of spectrum and apparatus licence arrangements in the band (defrag)
- > make more of the band available for wireless broadband use.

The Options paper also started the discussion on whether (and how) urban areas of NBN Co's 3400–3425 MHz and 3492.5–3542.5 MHz (3.5 GHz) PTS licences in the band could be made available for use by other operators.

This decision paper summarises and considers issues raised in submissions to the Options paper which have informed planning decisions the ACMA has made for the 3400–3575 MHz band. It also provides details on the process, with indicative timeframes, the ACMA intends to follow to implement planning decisions made.

Importantly, while the ACMA will manage and implement key aspects of this process, there are some elements that will need to be undertaken via negotiation and agreement between incumbent licensees or that are dependent on decisions made by the Minister (for example, designating parts of the spectrum to be allocated by issuing spectrum licences is a decision for the Minister).

For the purposes of this paper, the following geographical areas are defined in Appendix B:

- > metropolitan, regional and remote areas as well as major regional centres
- > geographical areas encompassed by NBN Co's 3.5 GHz PTS licences.

It is also noted that the ACMA recently conducted a [process to allocate](#) the remaining unsold spectrum in the 3.4 GHz spectrum licence band. The outcomes of this process will be considered when implementing planning decisions made in this paper.

Legislative and policy environment

The Options paper identified the relevant considerations in the ACMA's legislative and policy environment which inform its spectrum planning decisions. This included descriptions of:

- > the primary legislation under which the ACMA currently manages spectrum, being the *Radiocommunications Act 1992*, this includes the object of 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
 - > provide a responsive and flexible approach to meeting the needs of users of the spectrum
 - > 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.
- > the [Principles for Spectrum Management](#), which provide guidance when making decisions on spectrum use
- > the three licence types under which spectrum access can be authorised, being apparatus, spectrum and class licensing

- > key ACMA tools which provide transparency to industry and the public on spectrum management and allocation programs, including:
 - > the Mobile Broadband (MBB) strategy, which provides a framework for the consideration and, where deemed appropriate, progression of frequency bands to allocation for provision of mobile (and other wireless) broadband services
 - > the [FYSO 2019–23](#), which sets out the ACMA's forward work program over a five-year period.

Discussion

This chapter identifies the issues raised in submissions to the Options paper, discusses the differing views expressed and outlines the ACMA's response.

Overall approach to optimising the band

The Options paper identified three planning options to optimise arrangements in the 3400–3575 MHz band. These options facilitate a defrag of spectrum and apparatus licence arrangements, make more of the band available for wireless broadband use and investigate the potential availability of urban areas of NBN Co's PTS apparatus licences for use by other operators.

The planning options identified were:

- > Option 1—No change.
- > Option 2—Convert NBN Co's 3.5 GHz PTS licences to spectrum licences (conversion) and reallocate additional spectrum for spectrum licensing (reallocate). Two sub-options were identified:
 - > Option 2a reallocates all regional areas and major regional centres not currently subject to spectrum licensing.
 - > Option 2b reallocates some regional areas and major regional centres and provides more spectrum for localised wireless broadband use in those areas and frequencies not subject to spectrum licensing.
- > Option 3—Restack apparatus licences, then convert NBN Co's 3.5 GHz PTS licences to spectrum licences and reallocate additional spectrum for spectrum licensing. Two sub-options were identified:
 - > Option 3a reallocates all regional areas not encompassed by the newly restacked and consolidated localised wireless broadband apparatus licence arrangements.
 - > Option 3b reallocates regional areas and major regional centres in the 3400–3442.5 MHz frequency range and provides more spectrum for localised wireless broadband apparatus licensing in the remaining areas and frequencies not subject to spectrum licensing.

The ACMA identified Option 3b as its preferred planning option. This was because it most closely achieved the identified planning goals which were:

- > Barriers to change (for example, trading) are removed.
- > Arrangements for wireless broadband use are put in place across the entire 3400–3575 MHz band Australia-wide.
- > Area-based PTS and spectrum licensees achieve contiguous spectrum holdings in all areas they hold licences.
- > Area-based PTS and spectrum licensees maintain the same amount of spectrum in all areas they currently hold licences.
- > Spectrum arrangements for PMP licensing are consolidated into a single frequency range to facilitate the adoption of TDD wireless broadband technologies and provide access to larger channel sizes.
- > The amount of spectrum available for PMP licensing remains the same or increases in all areas. This provides an option for incumbent PMP licensees to continue operating in the band if they wish.

Option 3b is also assessed as achieving the greatest net public benefit compared to other options, by making more of the band available for both wide-area wireless broadband (such as mobile network operators) and localised wireless broadband services (such as wireless internet service providers (WISPs), miners and other industry verticals). The detailed assessment of the options against the planning goals is outlined in the Options paper.

Eight submissions were received to the Options paper. These were from NBN Co, Telstra, Optus, Vodafone Hutchison Australia (VHA), the Department of Defence, the Australian Radio Communications Industry Association (ARCIA), Lockheed Martin Australia and DB Telecommunications.

All submissions agreed there was a need to optimise arrangements in the 3400–3575 MHz band and there was general support for the ACMA's preferred planning option (Option 3b), with submissions providing additional suggestions on implementation. These are discussed further in 'Issues raised in submissions' below.

When determining whether and how to progress re-planning activities in the 3400–3575 MHz band, the ACMA considered a variety of issues. These included:

- > current uses of the band
- > international trends
- > issues raised in submissions to the Options paper
- > the effect each option would have on incumbent services
- > the relative incremental benefits and costs for each replanning option
- > an assessment of each planning option against its planning goals and the Principles for Spectrum Management (as outlined in the Options paper).

After considering all relevant issues, the ACMA has decided to proceed with Option 3b as illustrated in Figure 1.

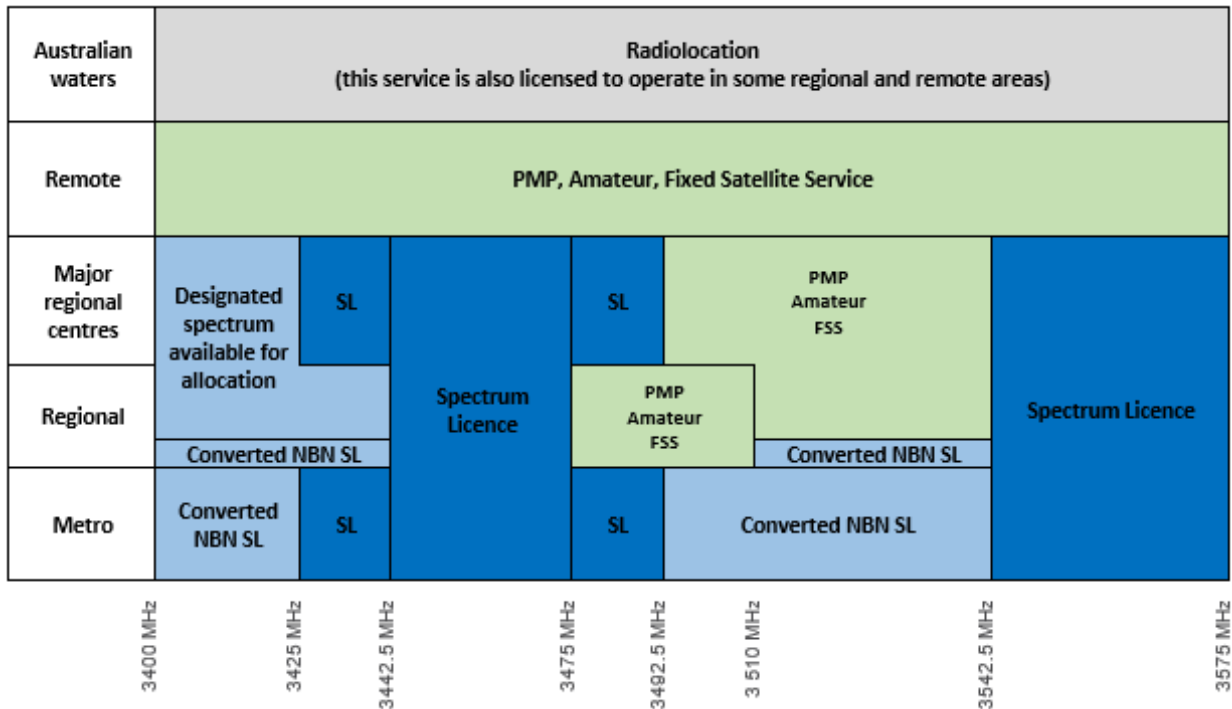
In the ACMA's view, this option best delivers the planning goals, is consistent with the Principles for Spectrum Management and it maximises overall public benefit by making more spectrum available for a range of uses that include wide-area wireless broadband and localised wireless broadband services.

The ACMA recognises that some of the steps to implement Option 3b require negotiation and commercial agreements between incumbent spectrum and apparatus licensees. This includes coordinating efforts to restack services, the creation of third-party authorisations where relevant and the trading (or variation) of spectrum licences to consolidate licence holdings. However, due to the strong support for change evident in submissions to the Options paper, the ACMA sees that there are strong incentives for incumbent licensees to participate in these activities to achieve a successful defrag of the band

The ACMA's overall implementation plan is provided in 'Planning decisions and preliminary views'.

Figure 1: Final planning arrangements for the 3400–3575 MHz band

FSS = fixed satellite service, PMP = point-to-multipoint, SL = spectrum licence



Issues raised in submissions

Submissions to the Options paper strongly supported the defrag of the band, but there were differing views expressed about the scope of defrag across different geographic areas, the investigation of a possible excise of urban areas of NBN Co apparatus licences and managing any impacts on incumbent licensees. Our consideration of the issues raised and our response to each is outlined below.

Geographic considerations

Different sets of concerns were raised in relation to remote areas and other population centres of metropolitan, regional and major regional areas.

Remote areas

Except for Option 1 (no change), all options proposed extending arrangements for PMP licensing across the entire 3400–3575 MHz band in remote areas. The Options paper further proposed that these arrangements be limited to services using time division duplex (TDD) technologies and incorporate existing arrangements in the adjacent 3575–3700 MHz band. This is because international standards for wireless broadband are based on TDD technologies that typically operate over the 3300–3800 MHz frequency range.

Submissions to the consultation were supportive of the approach proposed for remote areas. One submission also proposed developing arrangements for both PMP and PTS apparatus licensing across the entire band. This would facilitate deployments by mobile network operators (MNOs) and private networks.

ACMA response

Due to the support evident in submissions, the ACMA will implement the proposed arrangements for remote areas as outlined in the Options paper. The ACMA's current

preference is for PMP arrangements to be developed. This is because there is known demand for spectrum in some remote areas (particularly for mining uses). To enable this demand to be met in the shortest timeframe, it is preferable to adopt the fixed apparatus licensing and pricing arrangements for PMP use, which are already in place across the entire 3400–3700 MHz band. The alternative of using PTS licensing and pricing arrangements would take longer as it requires establishing new arrangements in the band, so it is not preferred at present, but the ACMA is open to further consideration of PTS licensing in the future.

In summary the ACMA will take the following actions in remote areas:

- > develop consolidated arrangements for PMP apparatus licences across the broader 3400–3700 MHz band to support TDD wireless broadband services
- > investigate making larger channel sizes available for PMP use (for example, 40–100 MHz)
- > grandfather existing frequency division duplex (FDD) PMP licences and provide them with ongoing protection. Due to the amount of spectrum being considered and there only being two FDD PMP licences in remote areas, this is expected to have a negligible impact on access to the band by new TDD PMP services
- > maintain existing arrangements for radiolocation, amateur and fixed satellite service (FSS) as well as devices operating under the Radiocommunications (Low Interference Potential Devices) Class Licence 2015 (the LIPD).

The ACMA considers that the development and implementation of arrangements in remote areas is not dependant on decisions made in other areas. Consequently, it intends to progress work in remote areas independently from work performed in metropolitan areas, regional areas and major regional centres.

Metropolitan areas, regional areas and major regional centres

The Options paper described the implementation process for Option 3b occurring over two phases in metropolitan areas, regional areas and major regional centres.

Phase 1 involves the restack of apparatus licences and conversion of NBN Co's 3.5 GHz PTS licences to spectrum licences.

Phase 2 involves developing arrangements for PMP licensing in relevant portions of the 3475–3542.5 MHz band and reallocating portions of the 3400–3442.5 MHz band for spectrum licensing in defined areas. While notionally Phase 2 would commence after Phase 1, it was identified that some of the work could be conducted in parallel. This includes developing arrangements for PMP licensing.

The ACMA sought comment on this process which included the following specific issues:

- > To remove possible impediments to the restack (or retuning) of services into defragmented spectrum arrangements, it was proposed that affected apparatus licences are not reissued beyond a defined date. The length of this period is something that the ACMA sought feedback on.
- > For any areas and frequencies that are reallocated for the issue of spectrum licences (refer to Figure 1), the ACMA sought feedback on the appropriate length of the reallocation period.
- > Is there benefit in converting metropolitan areas of NBN Co's 3.5 GHz PTS licences before the regional areas. Would this provide greater certainty for negotiations on defrag to occur?

Submissions to the consultation were generally supportive of the implementation process described for Option 3b. There was also interest in making more of the band available for wide-area and localised wireless broadband use in regional areas and major regional centres as proposed under Phase 2.

Submissions from ARCIA and DB Telecoms also indicated pent-up demand from localised wireless broadband operators for access to spectrum in metropolitan areas, regional areas and major regional centres.

There was interest from NBN Co, Telstra and Optus for the ACMA prioritising work on the defragmentation of spectrum arrangements. Optus noted that if a national defrag plan could not be agreed to in 2019, then the restack and defragmentation process should be prioritised in the highest value areas first. Optus further indicated individual regions could be progressively restacked according to an agreed priority between affected licensees.

For areas where coexistence issues or the absence of agreements between licensees might prevent restack from occurring, Optus proposed that the period before affected apparatus licences are not reissued should be twelve months. A timeframe of three years was proposed in areas where coexistence was possible. DB Telecoms believed a three to five-year timeframe was appropriate on the basis this was a restack rather than a reallocation process. VHA suggested a two-year period was sufficient, while NBN Co considered it desirable to have necessary commercial agreements in place before determining any maximum timeframes for restack to occur.

Optus considered an early conversion of metropolitan areas would facilitate defrag negotiations. However, while NBN Co was open to further discussion on the issue, they did not see any immediate benefits.

Telstra suggested that 5G operators should be consolidated at the top of the band and other operators, including NBN Co and legacy PMP services, at the bottom. This would increase the frequency separation between the services and enable 5G operators to adopt a more efficient frame structure when synchronising services. Telstra was also interested in requiring all wireless broadband services in the 3400–3575 MHz band to synchronise in the event there is interference and no agreement on how to resolve it.

Regarding the possible reallocation of spectrum for the issue of spectrum licences, recommended timeframes for the associated reallocation period ranged from 2–7 years. DB Telecoms stated that, consistent with the 3.6 GHz band, a seven-year period was appropriate. VHA and Telstra supported a two-year period, while Optus proposed a three-year period and believed seven years was excessive. Optus also wanted to ensure any reallocation process was, as far as possible, decoupled from the defragmentation of metropolitan areas.

Incumbent radiolocation (Department of Defence) and FSS earth station (Lockheed Martin Australia) licensees were interested in ensuring they could continue operating in the band.

ACMA response

The ACMA is progressing work on the optimisation of arrangements in the 3400–3575 MHz band as a matter of priority. To this end the ACMA will implement both phases of Option 3b as discussed in the Options paper.

To implement defrag, the ACMA has identified two key deliverables:

- > Operational defrag—This is achieved when licensees are operating devices in consolidated spectrum arrangements. At this point the cost and operational benefits of defrag will start being realised.
- > Licence defrag—This is achieved when licences are traded or varied to achieve contiguous holdings.

The ACMA considers that operational defrag can be achieved as part of the restack process. For spectrum licensees, licence defrag can be achieved after NBN Co's 3.5 GHz PTS licences are converted.

As suggested in submissions, it is possible for restack to be prioritised and implemented faster in different areas via agreement between licensees. This means operational defrag can be achieved in a relatively short period in key areas. The ACMA encourages such agreements being negotiated. It will also work with licensees to manage regulatory issues associated with the restack process including: the registration of devices near spectrum licence boundaries and/or that straddle spectrum and apparatus licences frequency boundaries. Affected PMP licensees will also be able to apply for new licences in the newly consolidated PMP spectrum arrangements.

To ensure a timely restack of services, the ACMA will adopt a policy of only reissuing PMP licences operating in the 3425–3442.5 MHz band in regional areas on the basis they expire on or before 30 November 2020. During this time alternative spectrum in the 3475–3510 MHz band will be made available for licensees to move into. Licensees will also be free to investigate other options, for details refer to 'Effect on incumbent licensees'. The same non-renewal timeframe will apply to the affected portions of NBN Co's 3.5 GHz PTS licence in the 3492.5–3510 MHz band that are required to move to the 3425–3442.5 MHz band.

This timeframe is considered suitable due to the small number of licences affected and the availability of equivalent alternative spectrum. It will also mean spectrum will be made available for new localised wireless broadband use in a shorter timeframe. It is expected that incumbent TDD PMP services will be able to retune into these consolidated arrangements using existing equipment. The ACMA also acknowledges that FDD PMP services may be required to replace equipment in order to move services. In such cases, licensees may also wish to investigate either negotiating arrangements to restack faster or obtain third-party access to NBN Co's spectrum holdings to enable ongoing operation on current frequencies.

To preserve options for PMP licensees and NBN Co during the restack process, an embargo will be placed on the 3425–3442.5 MHz and 3475–3510 MHz frequency ranges in regional areas. This will ensure there is clear spectrum for affected licensees to move into. The ACMA will also maintain the embargo in the 3400–3425 MHz and 3492.5–3542.5 MHz frequency ranges in metropolitan areas, regional areas and major regional centres. Once arrangements for new PMP licences are finalised these embargoes will be appropriately modified. The embargoes will remain in place in those areas and frequencies will be proposed for the issue of spectrum licences.

In parallel to the restack process, the ACMA will commence work to develop arrangements for PMP licensing in relevant parts of the band. If possible, the ACMA will also investigate making spectrum available for new licences while restack is occurring. However, this will be limited to those areas and frequencies that will not impact the restack process.

The ACMA considered whether to separate 5G services from other services in the band, including NBN Co's use of the spectrum. Under the current regulatory framework, the arrangements proposed under Option 3b enable this to be largely achieved via a combination of trading and third-party authorisations. For NBN Co this will be dependent on relevant agreements being reached to trade or vary their licences to the lower end of the band. In addition, existing PMP licensees will be confined to the

3475–3510 MHz frequency range. This provides a minimum 32.5 MHz frequency buffer with Telstra’s existing spectrum licences. When developing arrangements for new PMP licences in regional areas and major regional centres, the ACMA will also work with interested parties to implement appropriate conditions to manage interference. This will include consideration of an appropriate synchronisation requirement.

As part of the arrangements proposed under Option 3b it is intended that:

- > Incumbent radiolocation services can continue operating in the band under existing arrangements.
- > Amateur use in the band be limited to those areas and frequencies that that will not be subject to spectrum licensing. While this results in a change to the parts of the band that can be used, ultimately the total amount of spectrum available remains the same or increases in relevant areas.
- > Ongoing use of the band by FSS in regional areas be supported at the Earth station protection zones (ESPZs) defined in Radiocommunications allocation and licensing instruction MS44: [Frequency procedures for the earth station protection zones](#) (RALI MS44). To enable ongoing use, the frequency range covered by the ESPZs in eastern Australia will be extended to encompass those parts of the 3400–3575 MHz band not already subject to spectrum licensing (the 3400–3442.5 MHz and 3475–3542.5 MHz frequency ranges). Also, the ACMA does not propose these areas and frequencies be identified for spectrum licensing.
- > Existing class licence arrangements in the band remain in place.

The ACMA does not see benefit in converting metropolitan areas of NBN Co’s 3.5 GHz PTS licences before regional areas. Based on submissions it appears such an approach would not provide greater certainty for negotiations on defrag to occur.

With regards to the areas and frequencies proposed for reallocation under Option 3b, the ACMA now considers it is appropriate for these to be designated for spectrum licensing. This is because, after 30 November 2020, there should be no PMP or amateur licences operating in that spectrum. This would enable a single designation notice to cover the areas and frequencies proposed for conversion and allocation via the issue of spectrum licences. It also means there is no need to define a reallocation period and enables the defrag outcomes to be achieved earlier.

In summary the ACMA will take the following actions in metropolitan areas, regional areas and major regional centres:

- > Implement the planning arrangements detailed under both phases of Option 3b (refer to Figure 1). This includes:
 - > Adopting a policy of only reissuing PMP licences in the 3425–3442.5 MHz frequency range in regional areas on the basis they expire on or before 30 November 2020. Before this date, enable these licences to retune into the 3475–3510 MHz frequency range.
 - > Adopting a policy of only reissuing PTS licences in the 3492.5–3510 MHz frequency range in regional areas on the basis they expire on or before 30 November 2020. Before this date, enable these licences to retune into the 3425–3442.5 MHz frequency range. This will also require an amendment to the [Radiocommunications \(Transmitter Licence Tax\) Determination 2015](#) (Tax Determination) to include tax arrangements for PTS licences in the 3425–3442.5 MHz frequency range.
 - > Vary the [Radiocommunications Licence Conditions \(Amateur Licence\) Determination 2015](#) (the Amateur LCD) and [Radiocommunications \(Overseas Amateurs Visiting Australia\) Class Licence 2015](#) (the Visiting amateurs class licence) to only allow use in those areas and frequencies that that will not be subject to spectrum licensing.

- > Vary RALI MS44 so that ESPZs in eastern Australia cover those parts of the band not already subject to spectrum licensing (the 3400–3442.5 MHz and 3475–3542.5 MHz frequency ranges). The ACMA does not propose these areas and frequencies be identified for spectrum licensing.

Investigating a possible urban excise

The Options paper raised whether and how urban areas of NBN Co's 3.5 GHz PTS apparatus licences could be made available for use by other operators. Two possible approaches to facilitate this were identified:

1. negotiate access under third-party authorisation arrangements
2. identify and excise defined urban areas from NBN Co's licences and allocate them via market-based mechanisms (such as an auction)—referred to in this paper as 'urban excise'.

It was noted that while the first approach is available for interested parties to explore now, the second required further investigation by the ACMA to:

- > better understand NBN Co's current and future requirements in the 3400–3575 MHz band to identify possible urban excise areas
- > determine appropriate interference management techniques with relevant services
- > determine the effect the first two points have on the utility of any urban excise areas.

Noting that urban excise could occur under either of Options 2 or 3, the Options paper sought feedback on whether the ACMA should further investigate the issue or if using third-party arrangements would be adequate.

There were mixed views in submissions to the Options paper with regards to urban excise. Incumbent spectrum licensees (Optus, NBN Co and Telstra) did not support further investigation of this issue. Reasons for this included:

- > it would delay defrag as well as increase the cost and complexity of its implementation
- > the size and utility of possible excise areas had been overstated
- > managing interference with excised areas would be complicated and it would affect the ability of licensees to deploy new services
- > there would be an increase in geographical fragmentation of licence holdings across the broader 3400–3700 MHz band.

VHA, ARCIA and DB Telecommunications supported further investigating a possible urban excise, indicating strong demand for access to spectrum in these areas. They argued that the expected value of spectrum in metropolitan areas in combination with the low incentive NBN Co has in negotiating third party access made urban excise the most appropriate way forward. There was interest in making any areas identified available for use as soon as practicable, with respondents stating this should be prioritised over defrag.

One submission stated that the size and utility of urban excise areas could be improved by the adoption of appropriate licence conditions. There was also interest in ensuring that any allocation of urban excise areas took into account existing spectrum holdings in the 3400–3700 MHz band and other equivalent mid-range bands.

ACMA response

The ACMA recognises the benefits that can be realised from urban excise. Chief among these is making an additional 75 MHz of internationally harmonised 5G spectrum available for use in capital cities

Since receiving submissions to the Options paper, the ACMA has worked with NBN Co to define urban excise areas. This involved identifying the location of premises NBN Co is required to provide fixed wireless services to and using this information to determine unused urban areas. The resulting areas are described at Appendix C and illustrated in Figure 4. Since these areas are not required for use by NBN Co, the ACMA intends to take steps to excise them from NBN Co's licence holdings.

The ACMA will work with industry to develop suitable interference management criteria to and from these areas—which, together with their geographic extent, will also determine their utility. While these criteria are expected to be based on the existing 3.4 GHz band spectrum licence framework, there will likely be a need to investigate additional approaches to managing adjacent area interference. For example, a first-in-time coordination approach is expected to result in greater utility of the smaller urban excise areas. This will have to be balanced with the need to protect NBN Co's existing services and provide a reasonable level of assurance it can migrate to new technologies and/or densify its network as capacity requirements change.

Pending an assessment on the utility of the urban excise areas, based on interference management criteria developed, the ACMA will determine the most appropriate method of allocation. This could include an auction of spectrum licences if it is determined that the utility of the areas will result in sufficient demand and competing deployment models where certainty is required for long term investment decisions (for example if it could support the deployment of macro base stations). Other mechanisms such as class or apparatus licensing could be considered if there is limited demand and/or where use may be limited to indoor or small cell deployments. Apparatus licensing would only be available if the minister decides to repeal the notice designating the spectrum for spectrum licensing. Issues related to competition, including the possible implementation of competition limits, will be considered as part of the development of any allocation arrangements that take into account relevant market circumstances.

When implementing the arrangements defined in Option 3b, the ACMA considers work on defrag should be prioritised over work on urban excise. The reasons for this are:

- > The longer defrag is delayed and as more services are deployed, the more complicated it becomes to implement and the smaller the cost savings realised on infrastructure deployments.
- > Allocating urban excise areas will introduce one or more new licensees into defrag negotiations. This increases the risk that one party may not agree to implement defrag, especially if its holdings are already consolidated in the band.
- > It is considered unlikely that the negotiations and agreements required to implement defrag would occur before urban excise areas are allocated. This is because there would be no licensee in the urban excise areas to negotiate third party access or licence trades with. Incumbent licensees are unlikely to risk retuning services into urban excise areas in the short term without the long-term certainty they can remain in the spectrum.

Prioritising defrag means the excision of urban areas and their subsequent allocation would be delayed until after NBN Co's licences are converted and its licence holdings consolidated.

The process of excising urban areas will be conducted using the 'resuming spectrum licences' powers in Chapter 3 Part 3.2 Division 6 of the Act. The ACMA's current preference will be for any resumption to occur via agreement with the licensee, pursuant to section 89 of the Act. Work concerning the development of interference management criteria and determining the utility of urban excise areas can be conducted in parallel to the defrag process.

In summary the ACMA will take the following actions regarding urban excise:

- > Work with industry to develop interference management criteria to and from urban excise areas. This will be conducted in parallel to the work leading up to the allocation of urban excise areas.
- > Determine the utility of urban excise areas and an appropriate licensing approach to make the spectrum available.
- > Once defrag is complete, commence processes to resume urban excise areas pursuant to section 89 of the Act.
- > Develop allocation instruments (if appropriate) and allocate urban excise areas.

The ACMA's full implementation plan is provided below under 'ACMA planning decisions and preliminary views'.

Effect on incumbent licensees

The 3400–3575 MHz band is subject to a mix of spectrum, apparatus and class licensing arrangements. These arrangements authorise a variety of services, including wide-area and localised wireless broadband, fixed satellite, radiolocation and amateur services as well ultra-wide band (UWB) and building material analysis devices authorised for operation under the LIPD.

A key benefit of implementing Option 3b is that it minimises the impact on incumbent services. Existing spectrum and class licensed arrangements are not affected. Also, while a number of existing apparatus licensed services will be affected by the restack process, the final arrangements ensure they will have access to the same or more spectrum within the band.

Details on the effect the new planning arrangements will have on each incumbent service are provided below.

3.4 GHz spectrum licences

Optus, Telstra and NBN Co currently hold spectrum licences in the 3.4 GHz band. These licences will not be directly affected by the ACMA's planning decisions. However, the new arrangements are expected to remove barriers to facilitate negotiations on and implementation of defrag.

The new planning arrangements also propose, subject to a decision from the minister, that an additional 42.5 MHz and 25 MHz of spectrum be made available for spectrum licensing in major regional centres and defined regional areas respectively.

PTS licences

NBN Co is currently the only PTS licensee in the 3400–3575 MHz band. Under the planning decisions proposed in this paper, the ACMA will work with NBN Co to restack and then convert these to spectrum licences (refer to Appendix D of the Options paper for an overview of the conversion process). This will also require an amendment to the Tax Determination to include tax arrangements for PTS licences in the 3425–3442.5 MHz frequency range.

This process will require a decision by the Minister to designate the relevant areas and frequencies that will be converted to spectrum licences. At a minimum it is proposed it include the areas and frequencies currently covered by NBN Co's 3.5 GHz PTS licences. However, to enable NBN Co to continue operating existing services, the geographical boundaries of its converted licence may need to be extended in some regional areas, pursuant with section 53(3) of the Act. This will only be done to ensure existing services meet the requirements of the [Radiocommunications \(Unacceptable Levels of Interference—3.4 GHz Band\) Determination 2015](#), which controls the levels of emissions leaving a licence area.

PMP licences

Arrangements for PMP licensing in remote areas will be extended to cover the entire 3400–3700 MHz frequency range. Due to the amount of spectrum available and the small number of incumbent licences, existing PMP licences will not be required to move to the new arrangements. They will also be afforded ongoing protection from new services.

Existing arrangements for PMP licensing in the 3425–3442.5 MHz and 3475–3492.5 MHz frequency ranges in regional areas will be affected by the ACMA's planning decisions. Specifically, the arrangements will be consolidated to encompass the 3492.5–3510 MHz frequency range. To give effect to this outcome and facilitate implementation of the new planning arrangements across the broader 3400–3575 MHz band, the ACMA will adopt a policy of not reissuing PMP licences in the 3425–3442.5 MHz band beyond 30 November 2020.

The ACMA will also develop arrangements to support PMP apparatus licensing in the 3492.5–3542.5 MHz frequency range in major regional centres and the 3510–3542.5 MHz frequency range in those regional areas not designated for spectrum licensing.

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

- > 50 MHz in major regional centres
- > 35–67.5 MHz in regional areas
- > 300 MHz in remote areas (when combined with existing arrangements in the 3575–3700 MHz band).

This outcome ensures current and prospective PMP licensees have access to larger channel bandwidths and same or more spectrum in more areas. Importantly these arrangements also encompass spectrum in which there is a competitive global equipment ecosystem catering for both fixed and mobile wireless broadband services.

To achieve the intended outcome affected services will need to do one of the following:

- > retune services into the 3492.5–3510 MHz frequency range
- > relocate to another frequency band in areas where suitable alternative spectrum options exist
- > negotiate ongoing access to the spectrum via third-party arrangements—this will only be possible in areas covered by NBN Co's restacked 3.5 GHz PTS licences, or
- > cease operating in the band.

Table 1 summarises the PMP licensees and the number of licences affected by the ACMA's planning decisions. The ACMA notes that there are both FDD and TDD PMP services operating in the 3425–3442.5 MHz frequency range. It is anticipated that TDD

services will be able to retune their equipment to operate under the new arrangements. However, this may not be possible for FDD PMP licensees unless they replace their equipment with TDD systems.

Table 1: Summary of PTS, PMP and spectrum licensees affected by planning Option 3b (based on RRL data from 1 October 2019)

Licence type	Licensees	Number of licences
FDD-PMP	Agile Pty Ltd, Armidale Dumaresq Council, Aussie Broadband Pty Ltd, Davco Farming Company, HaleNET Pty Ltd, NC Cable Pty Ltd, Silk Telecom Pty Ltd, Uralla Shire Council	24
TDD-PMP	March IT Pty Ltd, Maules Creek Coal Pty Ltd, Satstream (Australia) Pty Ltd, Wujal Wujal Aboriginal Shire Council	7

Fixed satellite service (FSS)

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 satellite services. The frequencies and areas covered by these ESPZs are defined in RALI MS44. The Mingenew ESPZ already covers the entire 3400–3575 MHz band. However, the ESPZs in eastern Australia do not.

The ACMA intends to extend the frequency range covered by the ESPZs in eastern Australia to encompass those parts of the 3400–3575 MHz band not already subject to spectrum licensing (the 3400–3442.5 MHz and 3475–3542.5 MHz frequency ranges). It is the ACMA’s view that these areas and frequencies should not be identified for spectrum licensing.

FSS use in the 3400–3600 MHz band is usually on a secondary basis to the fixed and mobile services. To promote use of the ESPZs and provide certainty for current and future FSS services, FSS use in these areas will be afforded the same co-channel protection as in the directly adjacent 3600–4200 MHz band.

There is currently only one FSS licensee (Lockheed Martin) operating in the 3400–3575 MHz band. This is located at the Lockheed Martin facility near Uralla, NSW, which is one of the ESPZs identified in eastern Australia. The planned changes to RALI MS44 will ensure services at this facility can continue to operate.

Amateur services

The Amateur LCD and the Visiting amateurs class licence will be varied to enable amateur service use in those areas and frequencies that will not be subject to spectrum licensing in the 3400–3575 MHz band (refer to Figure 1). While this results in a change to the parts of the band that can be used, ultimately the total amount of spectrum available in all areas remains the same or increases. There are also equivalent spectrum options available for amateur services in the adjacent 3300–3400 MHz band.

Specific changes to the Amateur LCD and Visiting amateurs class licence include:

- > Enabling use of the 3492.5–3510 MHz band in all regional areas.
- > Prohibiting use of the following frequencies and areas that are identified for spectrum licencing:
 - > The 3400–3425 MHz frequency range in metropolitan areas, regional areas and major regional centres.
 - > The 3425–3442.5 MHz frequency range in regional areas.

- > The 3492.5–3510 MHz frequency range in metropolitan areas.
- > The 3510–3542.5 MHz frequency range in any areas potentially covered by converted NBN Co 3.5 GHz PTS licences. Subject to the Minister making the designation notice, to enable NBN Co to continue operating services under a spectrum licence to the same extent that they currently do, the geographical boundaries of their licence may need to be extended in some regional areas.

Radiolocation services

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

Devices operating under class licences

The LIPD defines arrangements for the following devices to operate across the 3.6 GHz band:

- > building material analysis transmitters operating in the 2200–8500 MHz band
- > ultra-wideband transmitters operating in the 3400–4800 MHz band.

Under the LIPD, these devices are not afforded protection from interference. Given this and their low interference potential, the ACMA does not intend to change existing arrangements for these devices.

ACMA planning decisions and preliminary views

This chapter summarises the ACMA's overall plan for the optimisation of the 3400–3575 MHz band.

An indicative timeline for the ACMA's full implementation plan is provided below under 'Next steps'. While the ACMA will manage and implement key aspects of this process, there are some elements that will need to be undertaken via negotiation and agreement between incumbent licensees or that are dependent on decisions made by the Minister (for example, to designate spectrum for spectrum licensing).

A full suite of licensing provisions and conditions that will apply as well as details on any allocation processes are not included in this paper. These will be developed as part of subsequent consultation processes in accordance with normal practice.

Regarding the optimisation of arrangements in the 3400–3575 MHz band the ACMA will:

- > Implement the planning arrangements detailed under both phases of Option 3b (refer to Figure 1). This includes:
 - > Restacking apparatus licences in the band.
 - > As restack nears completion and subject to ministerial designation, commencing processes to convert NBN Co's 3.5 GHz PTS licences to spectrum licences.¹
 - > As restack nears completion, commencing processes to designate relevant portions of the 3400–3442.5 MHz frequency range in major regional centres and defined regional areas for the issue of spectrum licences (refer to Figure 1). The process to allocate these areas will commence after urban excise is completed.
 - > Developing arrangements for localised wireless broadband use in those parts of the band that are not identified for spectrum licensing.
 - > Adopting a policy of only reissuing PMP licences in the 3425–3442.5 MHz frequency range in regional areas on the basis they expire on or before 30 November 2020. Before this date, enable these licences to retune into the 3425–3442.5 MHz frequency range. This will also require an amendment to the Tax Determination to include tax arrangements for PTS licences in the 3425–3442.5 MHz frequency range.
 - > Adopting a policy of only reissuing PTS licences in the 3492.5–3510 MHz frequency range in regional areas on the basis they expire on or before 30 November 2020. Before this date, enable these licences to retune to the 3425–3442.5 MHz frequency range.
 - > Varying the Amateur LCD and Visiting amateurs class licence as detailed under 'Effect on incumbent licensees' in this paper.
 - > Vary RALI MS44 so that ESPZs in eastern Australia cover those parts of the band not already subject to spectrum licensing (the 3400–3442.5 MHz and 3475–3542.5 MHz frequency ranges). The ACMA also does not propose these areas and frequencies be identified for spectrum licensing.

¹ Appendix D of the Options paper provides detail of the conversion process.

- > Progress work on urban excise by:
 - > Engaging with industry to develop interference management criteria to and from urban excise areas. This will be conducted in parallel to the work leading up to the allocation of urban excise areas.
 - > Determine the utility of urban excise areas and an appropriate licensing approach to make the spectrum available.
 - > Once defrag is complete, commencing processes to resume urban excise areas (as defined at Appendix C) from NBN Co's spectrum licences, pursuant to section 89 of the Act.
- > Allocate urban excise areas as well as spectrum licences in the 3400–3442.5 MHz frequency range in defined regional areas and the 3400–3425 MHz frequency range in major regional centres by:
 - > Developing allocation instruments.
 - > Conducting an allocation process for those areas and frequencies identified for spectrum licensing. This may include urban excise areas. If it does not, these areas will be made available via other appropriate means.

Next steps

To give effect to the planning decisions and preliminary views outlined in this paper, the ACMA has developed the implementation plan set out in Table 2.

Table 2: Indicative timetable for implementation of planning arrangements in the 3400–3575 MHz band

Step	Step detail	Comments	Individual step timeframes (cumulative timeframe)	Completion dates
Step 1a UTILITY OF URBAN EXCISE	Investigate utility of urban excise areas (performed in parallel to Steps 1, 2, 3 and 4)	<ul style="list-style-type: none"> > Work with stakeholders to develop interference management criteria to and from urban excise areas. > Assess utility of any identified areas considering interference management criteria. > Determine an appropriate method for making the spectrum available. 	8 months	Jun 2020
Step 1b RESTACK	Restack of apparatus licences and development of PMP arrangements	<ul style="list-style-type: none"> > Licences that have not been moved into the new band arrangement by 30 November 2020 will not be re-issued. > NBN Co and Optus may optionally choose to develop third party agreements to retune devices into consolidated spectrum holdings. > The minimum timeframe for restack is based on the time required to vary the Amateur LCD and Visiting amateurs class licence (5 months) which takes into account the Christmas holiday period. Restack can be finalised any time after this point and before 30 November 2020 via negotiation between incumbent licensees. It is possible for restack to be finished in some areas faster than others. > The ACMA will also consult on amendments to the Radiocommunications (Transmitter Licence Tax) Determination 2015 to include tax arrangements for PTS licences in the 3425–3442.5 MHz frequency range. > While restack is underway the ACMA will commence development of arrangements for new PMP licensing and associated arrangements in regional areas and major regional centres as well as remote areas > Development and implementation of new PMP arrangements may overlap with step 2, depending on how fast restack occurs. > Vary RALI MS44 	5–12 months (5–12 months)	Mar 2020–Nov 2020
Step 2 DESIGNATION	Designate relevant areas and frequencies. Convert NBN Co's apparatus licences to spectrum licences	<ul style="list-style-type: none"> > This step starts if and when the minister makes a designation notice via s.36 of the Act. This will not occur until <u>all</u> affected apparatus licences have been restacked in <u>all</u> areas. > The minister may, after consulting with the ACMA, give the ACMA a written notice designating a specified part of the spectrum in specified areas to be allocated by issuing spectrum licences. The ACMA may also, at the minister's request or on its own initiative, make a recommendation to the minister to make such a designation. Before making 	5.5 months (10.5–17.5 months)	Sep 2020–May 2021

Step	Step detail	Comments	Individual step timeframes (cumulative timeframe)	Completion dates
		such a recommendation the ACMA must give members of the public reasonable opportunity to make representations about the proposed recommendation		
Step 3 LICENCE CONSOLIDATION	Trading or s.72 variations of spectrum licences to consolidate holdings	> Actual timeframe is dependent on agreement from relevant spectrum licensees to trade or vary their licences.	2 months (12.5–19.5 months)	Nov 2020–Jul 2021
Step 4 RESUMPTION	Resumption of urban excise areas	> Performed under Chapter 3 Part 3.2 Division 6 of the Act.	2 months (14.5–21.5 months)	Jan 2021–Sep 2021
Step 5 ALLOCATION	Allocation of urban excise areas and additional regional areas identified for spectrum licensing	> This step involves the development of allocation instruments and conducting an allocation process.	15.5 months (30–37 months)	May 2022–Dec 2022

Glossary

Term	Definition
3.4 GHz spectrum licence band	Refers to the 3425–3492.5 MHz and 3542.5–3575 MHz frequency ranges
3.5 GHz band	Refers to the 3400–3425 MHz and 3492.5–3542.5 MHz frequency ranges
3.6 GHz band	Refers to the 3575–3700 MHz frequency range
3GPP	3 rd Generation Partnership Project An international body responsible for the standardisation of (cellular) mobile (including broadband) telecommunications, including the 2G, 3G, 4G and (soon) 5G technology standards.
The Act	Refers to the <i>Radiocommunications Act 1992</i>
Apparatus licence	An apparatus licence authorises, under the Act, the use of a radiocommunications device under a particular service type, in a particular frequency range and at a particular geographic location for a period of up to five years.
ASMG	Australian Spectrum Map Grid Used to define geographical areas over which spectrum licences are issued. The HCIS is used to define the cells that make up the ASMG. The ASMG is described in detail in the document: The Australian spectrum map grid 2012 . See also HCIS.
Class licence	A standing authorisation for the operation of an unlimited number of radiocommunications devices operating within a set of conditions specified within the authorisation.
Conversion	The process by which one or more apparatus licences within frequencies and areas covered by a ministerial designation notice made under section 36 of the Act are converted to spectrum licences.
Coordination	The process of assessing the interference potential existing licensed services and a proposed new service will have on each other. Coordination is deemed to fail if the level of interference exceeds the specified protection criteria for the services involved.
Embargo	A spectrum embargo is a policy notice of intent by the ACMA to restrict the allocation of new licences in a particular frequency range to support replanning of that frequency range. Spectrum may still be able to be accessed on an exception's basis through an application for an exemption to the embargo.

Term	Definition
ESPZ	<p>Earth station protection zone</p> <p>An ESPZ refers to areas where use of defined frequency ranges is being preserved for use by satellite services. The areas and frequencies covered by ESPZs are defined in Radiocommunications allocation and licensing instruction MS44: Frequency procedures for the earth station protection zones</p>
FDD	<p>Frequency Division Duplex</p> <p>A technique where downlink and uplink communications can operate at the same time but are separated by the allocation of different frequency blocks. The frequency separation between these blocks is known as the FDD 'split' (e.g. the FDD split between mobile services operating in the 803–960 MHz band is 45 MHz).</p>
FSS	Fixed satellite service
HCIS	<p>Hierarchical Cell Identification Scheme</p> <p>A naming convention developed by the ACMA that applies unique 'names' to each of the cells of the ASMG. Each five-minute of arc square cell in the ASMG is assigned a unique identifier, derived from the cell's position in a hierarchically arranged grouping of cells. The hierarchy has four levels. A detailed description of the HCIS is available on the ACMA website.</p> <p>See also ASMG.</p>
FSS	Fixed satellite service
HVU	<p>Highest value use</p> <p>When applied to spectrum, is the use for which spectrum can provide the greatest incremental value to economic welfare. The value provided to the economy by spectrum is typically due to reduced costs for spectrum users to provide services, or the ability to provide new services that would not be possible without the use of particular spectrum.</p>
Principles for spectrum management	<p>A set of principles developed by the ACMA to guide its approach to spectrum management. The key theme of the principles is that maximising the overall public benefit from use of the radiofrequency spectrum requires balanced application of both regulatory and market mechanisms. Details of the principles are available on the ACMA website.</p>
PMP	Point-to-multipoint
PTS	Public telecommunications service
Reallocation of spectrum	<p>Under section 153B of the Act, the Minister can reallocate specific frequencies and areas for the issue of spectrum (or apparatus) licences. A result of this process is the cancellation of incumbent apparatus licences in the identified areas at the end of a defined timeframe known as the reallocation period.</p>

Term	Definition
Reallocation period	The period of time before incumbent apparatus licenses that fall wholly or partially within the frequencies and areas to be reallocated under section 153B of the Act will be cancelled. The reallocation period is required to be a minimum of two years.
Spectrum licence	Issued under the Act to authorise the use of a particular frequency band within a particular geographic area for a period of up to 15 years. The geographic area can vary in size, up to and including the entire country.
TDD	Time Division Duplex A technique where downlink and uplink communications use the same frequency but are separated by the allocation of different slots. This means uplink and downlink communications cannot occur at the same time.
WISP	Wireless Internet Service Provider

Appendix A—planning goals

The ACMA's planning goals for the 3400–3575 MHz band are to ensure, as much as possible, the following:

- > Barriers to change (for example, trading) are removed.
- > Arrangements for wireless broadband use are put in place across the entire 3400–3575 MHz band, Australia-wide.
- > Area-based apparatus and spectrum licensees achieve contiguous spectrum holdings in all areas in which they hold licences.
- > Area-based apparatus and spectrum licensees' total spectrum holdings are maintained in all areas they hold licences.
- > Spectrum arrangements for localised wireless broadband apparatus licensing are consolidated into a single frequency range to facilitate the adoption of TDD technologies and provide access to larger channel sizes.
- > The amount of spectrum available for localised wireless broadband apparatus licensing remains the same or increases in all areas. This provides an option for incumbent localised wireless broadband apparatus licensees to continue operating in the band if they wish to do so.

Appendix B—geographical area definitions

This appendix provides a definition for the following areas used in this paper:

- > Metropolitan areas: These areas cover the capital cities of Adelaide, Brisbane, Canberra, Melbourne, Perth, Sydney. The exact areas mirror the capital city areas that formed part of the year 2000 auction of spectrum licenses in the 3425–3492.5 GHz and 3542.5–3575 MHz bands, whose definition can be found in the [marketing plan](#).
- > Major regional centres: These areas cover the cities of Albury, Ballarat, Bendigo, Cairns, Rockhampton, Hobart, Launceston, Toowoomba and Townsville. The exact areas mirror the [major regional centres](#) that formed part of the year 2000 auction of spectrum licenses in the 3425–3492.5 GHz and 3542.5–3575 MHz bands.
- > Regional areas: This area covers the regional areas defined in the [Radiocommunications \(Spectrum Re-allocation—3.6 GHz Band for Regional Australia\) Declaration 2018](#) with those areas encompassed in the definition of major regional centres removed.
- > Remote areas: This includes all those areas not encompassed in the definition of metropolitan, major regional centres and regional areas.
- > Areas covered by NBN Co's 3.5 GHz PTS licences: These areas encompass all metropolitan areas, the major regional centres of Ballarat, Bendigo and Toowoomba as well as part of the defined regional areas.

For each area the following is provided:

- > an illustration of the area (refer to Figure 2 and Figure 3)
- > HCIS identifiers describing the area (refer to Tables 3–6).

The HCIS coordinates in this appendix can be converted into a Placemark file (viewable in Google Earth) through a facility on the [ACMA website](#).

Figure 2: Illustration of metropolitan areas (yellow areas), major regional centres (orange areas), regional areas (blue areas) and remote areas (all other areas)

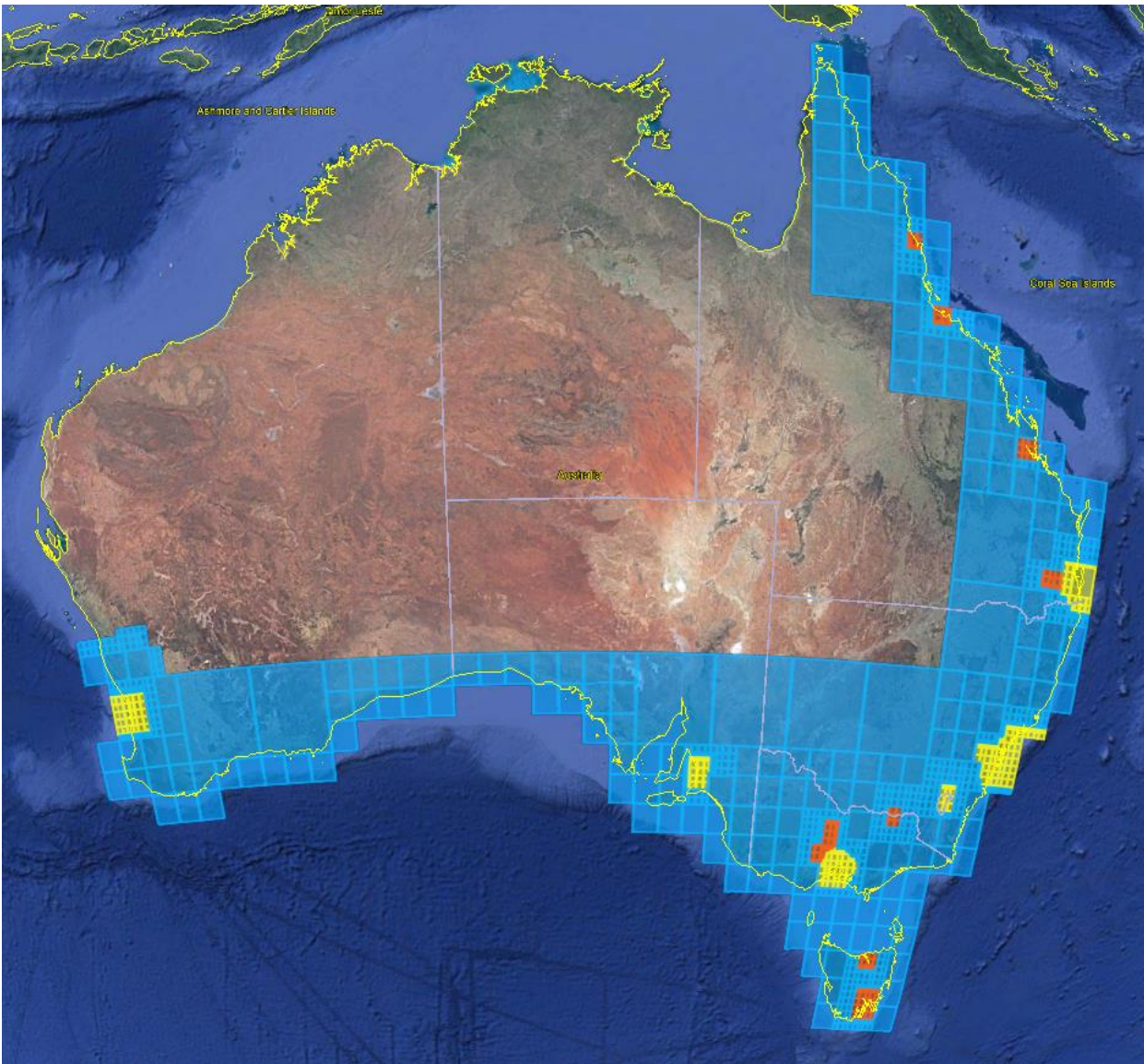


Figure 3: Areas covered by NBN Co's 3.5 GHz PTS licences (purple areas)

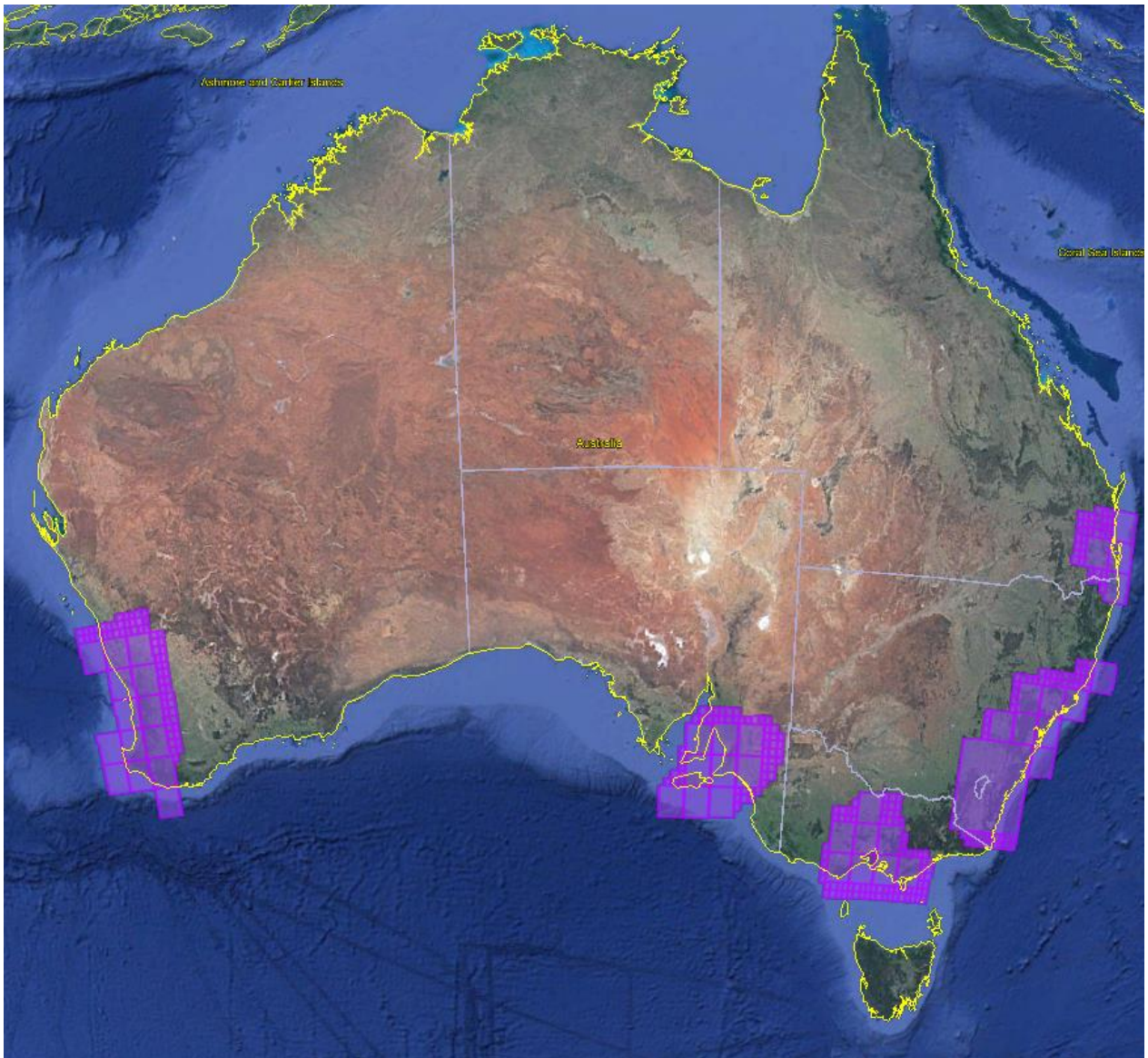


Table 3: HCIS description of metropolitan areas

Sub-area name	HCIS
Adelaide A	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 A	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 A	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 A	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 A	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

Sub-area name	HCIS
Sydney A	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, NW1M3, NW1N1, NW1N2, NW1N3, NW1O1, NW1O2, NW1O3, NW1P1, NW1P2, NW1P3

Table 4: HCIS description of major regional centres

Sub-area name	HCIS
Albury	LW5P, LW6M, LW8D, LW8H, LW9A, LW9E, LW5O2, LW5O3, LW5O5, LW5O6, LW5O8, LW5O9, LW8C2, LW8C3, LW8C5, LW8C6, LW8C8, LW8C9, LW8G2, LW8G3, LW8G5, LW8G6, LW8G8, LW8G9
Bendigo and Ballarat	KW9I, KW9J, KW9M, KW9N, KX2G, KX2H, KX2K, KX2L, KX3A, KX3B, KW8H6, KW8H9, KW8L3, KW8L6, KW8L9, KW8P3, KW8P6, KW8P9, KW9E4, KW9E5, KW9E6, KW9E7, KW9E8, KW9E9, KW9F4, KW9F5, KW9F6, KW9F7, KW9F8, KW9F9, KW9G4, KW9G5, KW9G7, KW9G8, KW9K1, KW9K2, KW9K4, KW9K5, KW9K7, KW9K8, KW9O1, KW9O2, KW9O4, KW9O5, KW9O7, KW9O8, KX2C7, KX2C8, KX2C9, KX2D3, KX2D6, KX2D7, KX2D8, KX2D9, KX2O1, KX2O2, KX2O3, KX2O4, KX2O5, KX2O6, KX2P1, KX2P2, KX2P3, KX2P4, KX2P5, KX2P6, KX3C1, KX3C2, KX3C4, KX3C5, KX3C7, KX3C8, KX3E1, KX3E2, KX3E3, KX3E4, KX3E5, KX3E6, KX3E7, KX3E8, KX3F1, KX3F2, KX3F3, KX3F4, KX3I1, KX3I2, KX3I4, KX3I5, KX3I7, KX3M1
Cairns	LQ1K, LQ1L, LQ1O, LQ1P, LQ1J2, LQ1J3, LQ1J5, LQ1J6, LQ1J8, LQ1J9, LQ1N2, LQ1N3, LQ1N5, LQ1N6, LQ1N8, LQ1N9, LQ4B2, LQ4B3, LQ4B5, LQ4B6, LQ4C1, LQ4C2, LQ4C3, LQ4C4, LQ4C5, LQ4C6, LQ4D1, LQ4D2, LQ4D3, LQ4D4, LQ4D5, LQ4D6
Hobart	LY8L, LY8P, LY9I, LY9J, LY9K, LY9L, LY9M, LY9N, LY9O, LY9P, LZ2D, LZ2H, LZ3A, LZ3B, LZ3C, LZ3D, LZ3E, LZ3F, LZ3G, LZ3H, LY8H4, LY8H5, LY8H6, LY8H7, LY8H8, LY8H9, LY9E4, LY9E5, LY9E6, LY9E7, LY9E8, LY9E9, LY9F4, LY9F5, LY9F6, LY9F7, LY9F8, LY9F9, LY9G4, LY9G5, LY9G6, LY9G7, LY9G8, LY9G9, LY9H4, LY9H5, LY9H6, LY9H7, LY9H8, LY9H9, LZ2L1, LZ2L2, LZ2L3, LZ3I1, LZ3I2, LZ3I3, LZ3J1, LZ3J2, LZ3J3, LZ3K1, LZ3K2, LZ3K3, LZ3L1, LZ3L2, LZ3L3

Sub-area name	HCIS
Launceston	LY5C, LY5D, LY5G, LY5H, LY6A, LY6B, LY6E, LY6F, LY5K1, LY5K2, LY5K3, LY5K4, LY5K5, LY5K6, LY5L1, LY5L2, LY5L3, LY5L4, LY5L5, LY5L6, LY6I1, LY6I2, LY6I3, LY6I4, LY6I5, LY6I6, LY6J1, LY6J2, LY6J3, LY6J4, LY6J5, LY6J6
Rockhampton	MS6A, MS6B, MS6C, MS6D, MS6E, MS6F, MS6G, MS6H, MS6I, MS6J, MS6K, MS6L
Toowoomba	NT7H, NT7L, NT8E, NT8F, NT8I, NT8J, NT7G2, NT7G3, NT7G5, NT7G6, NT7G8, NT7G9, NT7K2, NT7K3, NT7K5, NT7K6, NT7K8, NT7K9, NT7O2, NT7O3, NT7O5, NT7O6, NT7P1, NT7P2, NT7P3, NT7P4, NT7P5, NT7P6, NT8M1, NT8M2, NT8M3, NT8M4, NT8M5, NT8M6, NT8N1, NT8N1, NT8N2, NT8N3, NT8N4, NT8N5, NT8N6
Townsville	LR2C, LR2D, LR2G, LR2H, LQ8N8, LQ8N9, LQ8O7, LQ8O8, LQ8O9, LQ8P7, LQ8P8, LQ8P9, LR2B2, LR2B3, LR2B5, LR2B6, LR2B8, LR2B9, LR2F2, LR2F3, LR2F5, LR2F6, LR2F8, LR2F9, LR2J2, LR2J3, LR2J5, LR2J6, LR2K1, LR2K2, LR2K3, LR2K4, LR2K5, LR2K6, LR2L1, LR2L2, LR2L3, LR2L4, LR2L5, LR2L6, LR3A1, LR3A2, LR3A4, LR3A5, LR3A7, LR3A8, LR3E1, LR3E2, LR3E4, LR3E5, LR3E7, LR3E8, LR3I1, LR3I2, LR3I4, LR3I5

Table 5: HCIS description of regional areas

Sub-area name	HCIS
Regional	CV, DV, IV, JV, KQ, KV, LV, 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, KW1, KW2, KW3, KW4, KW5, KW6, KW7, KX1, KX4, KX5, KX8, KX9, KY2, KY3, KY6, LP4, LP7, LQ2, LQ5, LQ7, LR1, LR4, LR5, LR6, LR7, LR8, LR9, LW1, LW2, LW3, LW4, LW7, LX2, LX3, LX5, LX6, LX7, LX8, LX9, LY1, LY2, LY3, LY4, LY7, LZ1, MR1, MR4, MR5, MR7, MR8, MR9, MS1, MS2, MS3, MS4, MS5, MS7, MS8, MS9, 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, 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, KW8A, KW8B, KW8C, KW8D, KW8E, KW8F, KW8G, KW8I, KW8J, KW8K, KW8M, KW8N, KW8O, KW9A, KW9B, KW9C, KW9D, KW9H, KW9L, KW9P, KX2A, KX2B, KX2E, KX2F, KX2I, KX2J, KX2M, KX2N, KX3D, KX6M, KX6N, KX6O, KX6P, LQ1A, LQ1B, LQ1C, LQ1D, LQ1E, LQ1F, LQ1G, LQ1H, LQ1I, LQ1M, LQ4A, LQ4E, LQ4F, LQ4G, LQ4H, LQ4I, LQ4J, LQ4K, LQ4L, LQ4M, LQ4N, LQ4O, LQ4P, LQ8A, LQ8B, LQ8C, LQ8D, LQ8E, LQ8F, LQ8G, LQ8H, LQ8I, LQ8J, LQ8K, LQ8L, LQ8M, LR2A, LR2E, LR2I, LR2M, LR2N, LR2O, LR2P, LR3B, LR3C, LR3D, LR3F,

LR3G, LR3H, LR3J, LR3K, LR3L, LR3M, LR3N, LR3O, LR3P, LW5A, LW5B, LW5C, LW5D, LW5E, LW5F, LW5G, LW5H, LW5I, LW5J, LW5K, LW5L, LW5M, LW5N, LW6A, LW6B, LW6C, LW6D, LW6E, LW6F, LW6G, LW6H, LW6I, LW6J, LW6K, LW6L, LW6N, LW6O, LW6P, LW8A, LW8B, LW8E, LW8F, LW8I, LW8J, LW8K, LW8L, LW8M, LW8N, LW8O, LW8P, LW9B, LW9C, LW9D, LW9F, LW9G, LW9H, LW9I, LW9J, LW9K, LW9L, LW9M, LW9N, LW9O, LW9P, LX1A, LX1B, LX1C, LX1D, LX1F, LX1G, LX1H, LX1L, LX1P, LX4D, LX4G, LX4H, LX4K, LX4L, LX4M, LX4N, LX4O, LX4P, LY5A, LY5B, LY5E, LY5F, LY5I, LY5J, LY5M, LY5N, LY5O, LY5P, LY6C, LY6D, LY6G, LY6H, LY6K, LY6L, LY6M, LY6N, LY6O, LY6P, LY8A, LY8B, LY8C, LY8D, LY8E, LY8F, LY8G, LY8I, LY8J, LY8K, LY8M, LY8N, LY8O, LY9A, LY9B, LY9C, LY9D, LZ2A, LZ2B, LZ2C, LZ2E, LZ2F, LZ2G, LZ2I, LZ2J, LZ2K, LZ2M, LZ2N, LZ2O, LZ2P, LZ3M, LZ3N, LZ3O, LZ3P, MS6M, MS6N, MS6O, MS6P, 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, NT7A, NT7B, NT7C, NT7D, NT7E, NT7F, NT7I, NT7J, NT7M, NT7N, NT8A, NT8B, 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, KW8H1, KW8H2, KW8H3, KW8H4, KW8H5, KW8H7, KW8H8, KW8L1, KW8L2, KW8L4, KW8L5, KW8L7, KW8L8, KW8P1, KW8P2, KW8P4, KW8P5, KW8P7, KW8P8, KW9E1, KW9E2, KW9E3, KW9F1, KW9F2, KW9F3, KW9G1, KW9G2, KW9G3, KW9G6, KW9G9, KW9K3, KW9K6, KW9K9, KW9O3, KW9O6, KW9O9, KX2C1, KX2C2, KX2C3, KX2C4, KX2C5, KX2C6, KX2D1, KX2D2, KX2D4, KX2D5, KX2O7, KX2O8, KX2O9, KX2P7, KX2P8, KX2P9, KX3C3, KX3C6, KX3C9, KX3G3, KX3H1, KX3H2, KX3H3, LQ1J1, LQ1J4, LQ1J7, LQ1N1, LQ1N4, LQ1N7, LQ4B1, LQ4B4, LQ4B7, LQ4B8, LQ4B9, LQ4C7, LQ4C8, LQ4C9, LQ4D7, LQ4D8, LQ4D9, LQ8N1, LQ8N2, LQ8N3, LQ8N4, LQ8N5, LQ8N6, LQ8N7, LQ8O1, LQ8O2, LQ8O3, LQ8O4, LQ8O5, LQ8O6, LQ8P1, LQ8P2, LQ8P3, LQ8P4, LQ8P5, LQ8P6, LR2B1, LR2B4, LR2B7, LR2F1, LR2F4, LR2F7, LR2J1, LR2J4, LR2J7, LR2J8, LR2J9, LR2K7, LR2K8, LR2K9, LR2L7, LR2L8, LR2L9, LR3A3, LR3A6, LR3A9, LR3E3, LR3E6, LR3E9, LR3I3, LR3I6, LR3I7, LR3I8, LR3I9, LW5O1, LW5O4, LW5O7, LW8C1, LW8C4, LW8C7, LW8G1, LW8G4, LW8G7,

	<p>LX1E1, LX1E2, LX1E3, LX1E5, LX1E6, LX1J2, LX1J3, LX1K1, LX1K2, LX1K3, LX1K5, LX1K6, LX1K8, LX1K9, LX4F3, LX4F6, LX4F9, LX4J3, LX4J6, LX4J9, LY5K7, LY5K8, LY5K9, LY5L7, LY5L8, LY5L9, LY6I7, LY6I8, LY6I9, LY6J7, LY6J8, LY6J9, LY8H1, LY8H2, LY8H3, LY9E1, LY9E2, LY9E3, LY9F1, LY9F2, LY9F3, LY9G1, LY9G2, LY9G3, LY9H1, LY9H2, LY9H3, LZ2L4, LZ2L5, LZ2L6, LZ2L7, LZ2L8, LZ2L9, LZ3I4, LZ3I5, LZ3I6, LZ3I7, LZ3I8, LZ3I9, LZ3J4, LZ3J5, LZ3J6, LZ3J7, LZ3J8, LZ3J9, LZ3K4, LZ3K5, LZ3K6, LZ3K7, LZ3K8, LZ3K9, LZ3L4, LZ3L5, LZ3L6, LZ3L7, LZ3L8, LZ3L9, 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, MW3P8, 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, NT7G1, NT7G4, NT7G7, NT7K1, NT7K4, NT7K7, NT7O1, NT7O4, NT7O7, NT7O8, NT7O9, NT7P7, NT7P8, NT7P9, NT8M7, NT8M8, NT8M9, NT8N7, NT8N8, NT8N9, 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</p>
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Table 6: HCIS description of the areas covered by NBN Co’s 3.5 GHz PTS licences

Sub-area name	HCIS
Adelaide B	IV8K, IV8L, IV8N, IV8O, IV8P, IV9I, IV9J, IV9K, IV9L, IV9M, IV9N, IV9O, IV9P, IW1P, IW2, IW3, IW4D, IW4H, IW4K, IW4L, IW4N, IW4O, IW4P, IW5, IW6, IW7, IW8, IW9, JV7M, JV7N, JV7O, JV7P, JV8M, JW1, JW2A, JW2B, JW2E, JW2F, JW2G, JW2I, JW2J, JW2K, JW2M, JW2N, JW2O, JW4, JW5A, JW5B, JW5C, JW5E, JW5F, JW5I, JW5J, JW5M, JW7A, JW7B, JW7C, JW7D, JW7E, JW7F, JW7G, JW7I
Brisbane B	NT4G, NT4H, NT4K, NT4L, NT4O, NT4P, NT5D, NT5E, NT5F, NT5G, NT5H, NT5I, NT5J, NT5K, NT5L, NT5M, NT5N, NT5O, NT5P, NT6, NT7C, NT7D, NT7G, NT7H, NT7K, NT7L, NT7O, NT7P, NT8, NT9, NU2B, NU2C, NU2D, NU2F, NU2G, NU2H, NU2L, NU3

Sub-area name	HCIS
Canberra/ Sydney B	MV2P, MV3L, MV3M, MV3N, MV3O, MV3P, MV5D, MV5H, MV5L, MV5P, MV6, MV8D, MV8H, MV8J, MV8K, MV8L, MV8N, MV8O, MV8P, MV9, MW, MX1C, MX1D, MX1H, MX2A, MX2B, MX2C, MX2D, MX2E, MX2F, MX2G, MX2H, MX3A, MX3B, MX3C, MX3D, MX3E, MX3F, MX3G, MX3H, NV1I, NV1J, NV1K, NV1L, NV1M, NV1N, NV1O, NV1P, NV2I, NV2J, NV2K, NV2L, NV2M, NV2N, NV2O, NV2P, NV3I, NV3J, NV3K, NV3L, NV3M, NV3N, NV3O, NV3P, NV4, NV5, NV7, NW1
Melbourne B	KW8H, KW8I, KW8J, KW8K, KW8L, KW8M, KW8N, KW8O, KW8P, KW9E, KW9F, KW9G, KW9H, KW9I, KW9J, KW9K, KW9L, KW9M, KW9N, KW9O, KW9P, KX1P, KX2, KX3, KX4D, KX4H, KX4L, KX4P, KX5, KX6, KX8, KX9, LW7I, LW7J, LW7M, LW7N, LW7O, LW7P, LX1, LX2E, LX2I, LX2M, LX2N, LX2O, LX4, LX5A, LX5B, LX5C, LX5D, LX5E, LX5F, LX5G, LX5H, LX5I, LX5J, LX5K, LX5L, LX5M, LX5N, LX5O, LX5P, LX7, LX8
Perth B	AU6I, AU6J, AU6K, AU6L, AU6M, AU6N, AU6O, AU6P, AU9, AV9, AW3, BU4H, BU4I, BU4J, BU4K, BU4L, BU4M, BU4N, BU4O, BU4P, BU5E, BU5F, BU5G, BU5H, BU5I, BU5J, BU5K, BU5L, BU5M, BU5N, BU5O, BU5P, BU7, BU8, BU9A, BU9B, BU9E, BU9F, BU9I, BU9J, BU9M, BU9N, BV1, BV2, BV3A, BV3B, BV3E, BV3F, BV3I, BV3J, BV3M, BV3N, BV4, BV5, BV6A, BV6B, BV6E, BV6F, BV6I, BV6J, BV6M, BV6N, BV7, BV8, BV9A, BV9B, BV9E, BV9F, BV9I, BV9J, BV9M, BV9N, BW1, BW2, BW3A, BW5

Appendix C—urban excise areas

This appendix provides a definition of urban excise areas. For each area the following is provided:

- > an illustration of the area (refer to Figure 4)
- > HCIS identifiers describing the area (refer to Table 7).

The HCIS coordinates in this appendix can be converted into a Placemark file (viewable in Google Earth) through a facility on the [ACMA website](#).

Table 7: HCIS description of urban excise areas

Sub-area name	HCIS
Adelaide C	IW3N, IW3O4, IW3O5, IW3O7, IW3O8, IW6B1, IW6B2, IW6B3, IW6B5, IW6B6
Brisbane C	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 C	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 C	KX3P, KX3L6, KX3L7, KX3L8, KX3L9, KX6D1, KX6D2, KX6D3, KX6D5, KX6D6, LX1M, LX1I7, LX1N4, LX4A1, LX4A2, LX4A3, LX4A4, LX4A5, LX4B1
Perth C	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 C	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

Figure 4: Illustration of urban excise areas (purple areas)

